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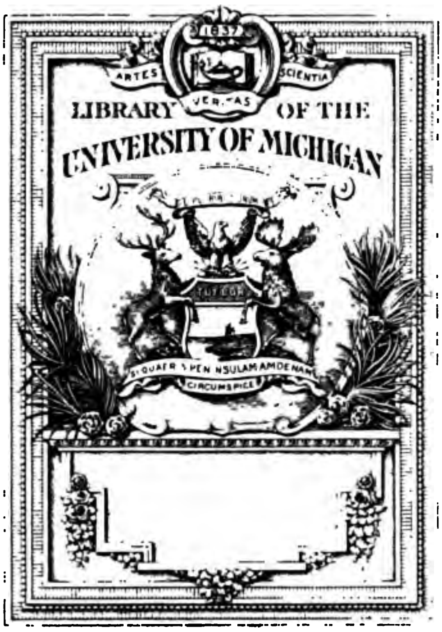

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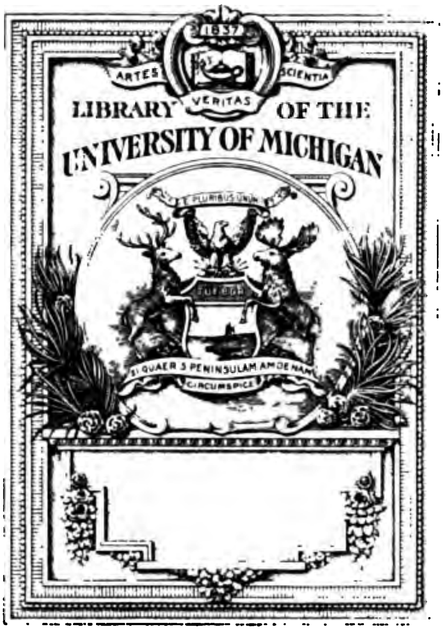
No. 171

BOUNDARIES OF THE UNITED STATES, STATES, AND TERRITORIES WITH OUTLINE OF HISTORY OF IMPORTANT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UNITED STATES

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No. 171

BOUNDARIES OF THE UNITED STATES, STATES, AND TERRITORIES WITH OUTLINE OF HISTORY OF IMPORTANT CHANGES (Second edition).—GANNETT

WASHINGTON
GOVERNMENT PRINTING OFFICE
1900

UNITED STATES GEOLOGICAL SURVEY
CHARLES D. WALCOTT, DIRECTOR

BOUNDARIES

OF

THE UNITED STATES

AND OF THE

SEVERAL STATES AND TERRITORIES

WITH AN OUTLINE OF THE

HISTORY OF ALL IMPORTANT CHANGES OF TERRITORY

(SECOND EDITION)

BY

HENRY GANNETT

WASHINGTON
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LETTER OF TRANSMITTAL.

DEPARTMENT OF THE INTERIOR,
UNITED STATES GEOLOGICAL SURVEY,
Washington, D. C., April 14, 1900.

SIR: I have the honor to submit herewith a sketch of the boundaries of the United States, the several States, and the Territories, as defined by treaty, charter, or statute. Besides giving the present status of these boundaries I have endeavored to present an outline of the history of all important changes of territory, with the laws appertaining thereto.

The work constitutes a revised and enlarged edition of Bulletin No. 13, published in 1885.

Very respectfully,
HENRY GANNETT,
Geographer.

Hon. C. D. WALCOTT,
Director United States Geological Survey.

BOUNDARIES OF THE UNITED STATES AND OF THE SEVERAL STATES AND TERRITORIES, WITH AN OUTLINE OF THE HISTORY OF ALL IMPORTANT CHANGES OF TERRITORY.

By HENRY GANNETT.

CHAPTER I.

BOUNDARIES OF THE UNITED STATES; AND ADDITIONS TO ITS TERRITORY.

BOUNDARIES OF THE UNITED STATES.

PROVISIONAL TREATY WITH GREAT BRITAIN.

The original limits of the United States were first definitely laid down in the provisional treaty made with Great Britain in 1782. The second article of that treaty defines its boundaries as follows:

> From the northwest angle of Nova Scotia, viz, that angle which is formed by a line drawn due north from the source of St. Croix river to the highlands; along the Highlands which divide those rivers that empty themselves into the river St. Lawrence, from those which fall into the Atlantic Ocean, to the northwesternmost head of Connecticut River; thence down along the middle of that river to the forty-fifth degree of north latitude; from thence, by a line due west on said latitude until it strikes the river Iroquois or Cataraquy (St. Lawrence); thence along the middle of said river into Lake Ontario, through the middle of said lake until it strikes the communication by water between that lake and Lake Erie; thence along the middle of said communication into Lake Erie, through the middle of said lake until it arrives at the water communication between that lake and Lake Huron; thence along the middle of said water communication into the Lake Huron; thence through the middle of said lake to the water communication between that lake and Lake Superior; thence through Lake Superior northward of the Isles Royal and Phelippeaux to the Long Lake; thence through the middle of said Long Lake, and the water communication between it and the Lake of the Woods, to the said Lake of the Woods; thence through the said lake to the most northwestern point thereof, and from thence on a due west course to the river Mississippi; thence by a line to be drawn along the middle of the said river Mississippi until it shall intersect the northernmost part of the thirty-first degree of north latitude. South by a line to be drawn due east from the determination of the line last mentioned, in the latitude of thirty-one degrees north of the Equator, to the middle of the river Apalachicola or Catahouche; thence along the middle thereof to its junction with the Flint River; thence strait to the head of St. Mary's River; and thence down along the middle of St. Mary's River to the Atlantic Ocean. East by a line to be drawn along the middle of the river St. Croix, from its mouth in the Bay of Fundy to its source, and from its source directly north to the aforesaid highlands which divide the rivers that fall into the Atlantic Ocean from those which fall into the river St. Lawrence; comprehending all islands within twenty leagues of any part of the shores of the United States, and lying between lines to be drawn due east from the points where the aforesaid boundaries between Nova Scotia on the one part and East Florida on the other, shall respectively touch the Bay of Fundy and the Atlantic Ocean; excepting such islands as now are, or heretofore have been within the limits of the said province of Nova Scotia.

TREATY WITH SPAIN OF 1798.

The boundary between the United States and the Spanish Possessions, known as the Floridas, is reaffirmed in the treaty between the United States and Spain, made in 1795, in the following terms:

> The southern boundary of the United States, which divides their territory from the Spanish colonies of East and West Florida, shall be designated by a line beginning on the river Mississippi, at the northernmost part of the thirty-first degree of latitude north of the equator, which from thence shall be drawn due east to the middle of the river Apalachicola or Catahouche, thence along the middle thereof to its junction with the Flint; thence straight to the head of St. Mary's River, and thence down the middle thereof to the Atlantic Ocean.

DEFINITIVE TREATY WITH GREAT BRITAIN.

The definitive treaty of peace with Great Britain, concluded September 3, 1783, defines the boundaries of the United States in terms similar to those of the provisional treaty.

The northern boundary became at once a fruitful source of dissension between the two countries. From the time of the conclusion of peace almost to the present day this line has been the subject of a series of treaties, commissions, and surveys for the purpose of interpreting its terms.

The following is in outline a history of the settlement of this boundary:

TREATY OF LONDON, 1794.

The fourth article of the treaty of London, signed November 19, 1794, provided that—

> Whereas it is uncertain whether the river Mississippi extends so far to the northward as to be intersected by a line to be drawn due west from the Lake of the Woods in the manner mentioned in the treaty of peace between His Majesty and the United States, etc., the two parties will proceed by amicable negotiation to regulate the boundary line in that quarter.

This matter was not settled, however, until 1818.

The fifth article of the same treaty makes provision for settling another doubtful point, as follows:

> Whereas doubts have arisen what river was truly intended under the name of the river St. Croix mentioned in the said treaty of peace, and forming a part of the boundary therein described, that question shall be referred to the final decision of commissions to be appointed in the following manner, viz.

Here follow provisions that His Majesty and the President of the United States should each appoint a commissioner, and that these two commissioners should agree on a third, or, they failing to agree on the third, he was to be chosen by lot in their presence.

Which was the true St. Croix River had been a matter of controversy between the governments of Massachusetts and Nova Scotia since the year 1764.

The commissioners appointed under the foregoing provisions decided, on the 25th of October, 1798, the river called Schoodiac and the northern branch thereof (called Cheputnaticook) to be the true river St. Croix, and that its source was at the northernmost headspring of the northern branch aforesaid. A monument was erected at that spot under the direction of the commissioners. (See Memoirs of Northeastern *Boundary*, Gallatin, pages 7, 8.)

TREATY OF GHENT.

By the treaty of peace concluded at Ghent, December 24, 1814, it was agreed to provide for a final adjustment of the boundaries described in the treaty of 1783, which had not yet been ascertained and determined, embracing certain islands in the Bay of Fundy and the whole of the boundary line from the source of the river St Croix to the most northwestern point of the Lake of the Woods.

By article 4 provision was made for a board of commissioners to settle the title to several islands in the Bay of Passamaquoddy, which is a part of the Bay of Fundy, and the island of Grand Menan in the said Bay of Fundy.

The fifth article made provision for a board of commissioners to settle the boundary from the source of the river St. Croix northward to the highland which divides those waters that empty themselves into the river St. Lawrence from those which fall into the Atlantic Ocean, thence along said highlands to the northwesternmost head of Connecticut River, thence down along the middle of that river to the forty-fifth degree of north latitude, thence due west on said latitude until it strikes the river Iroquois or Cataraquy (St. Lawrence).

The sixth and seventh articles provided for commissioners to continue the line to the northwestern point of the Lake of the Woods.

(For further details see treaty, Statutes at Large, vol. 8, pages 220–2.)

It was provided by this treaty that in case any of the boards of commissioners were unable to agree, they should make separately or jointly a report or reports to their respective Governments stating the points on which they differed, the grounds on which they based their respective opinions, etc.

These reports were to be referred to some friendly sovereign or state for arbitration.

The first and third boards of commissioners above mentioned came to an agreement, and those portions of the boundary were thus finally settled; but the commission appointed under the fifth article, after sitting nearly five years, could not agree on any of the matters referred to them, nor even on a general map of the country exhibiting the boundaries respectively claimed by each party. They accordingly made separate reports to their Governments, stating the points on which they differed and the grounds upon which their respective opinions had been formed.

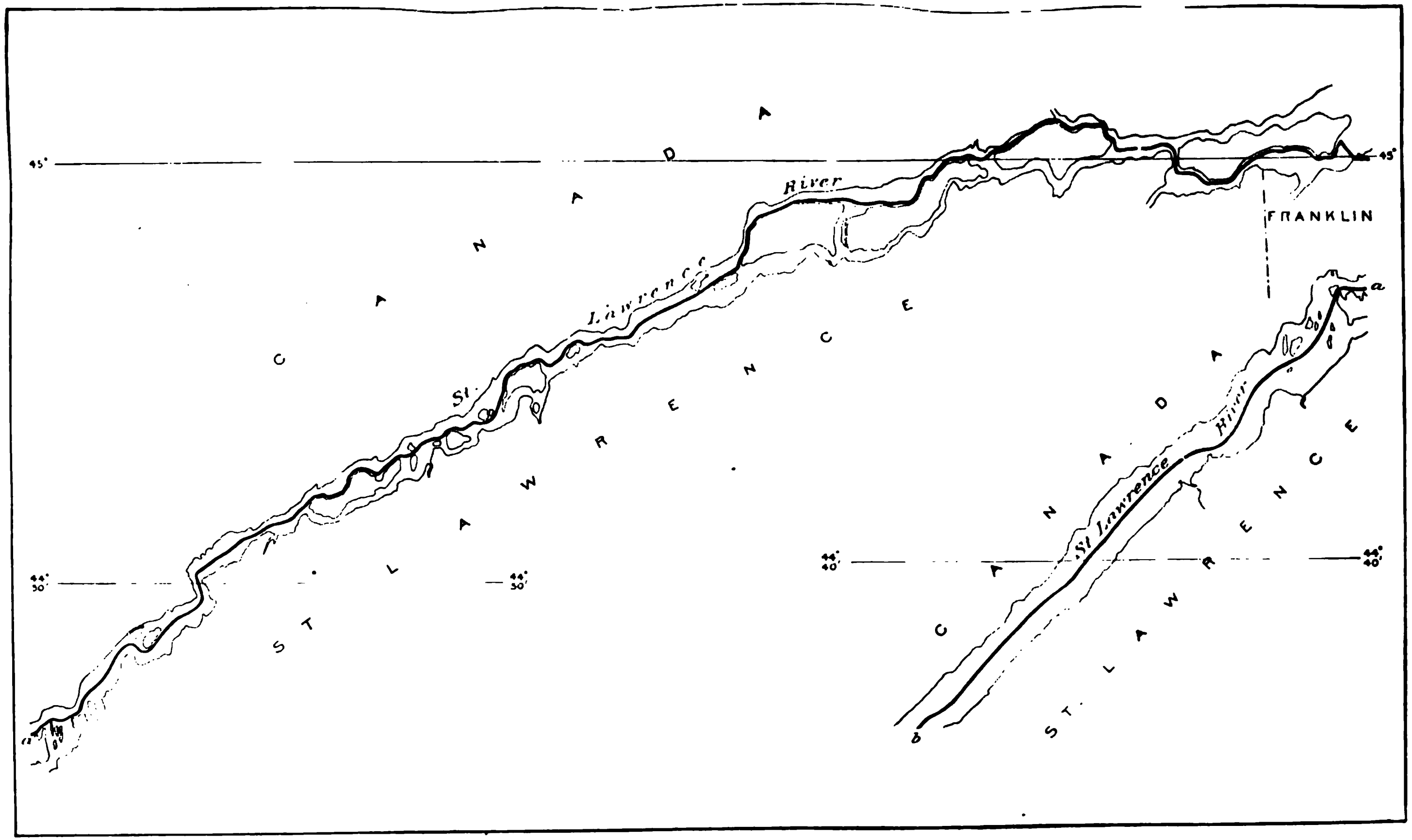
The first of these commissions awarded Moore, Dudley, and Frederick Islands to the United States, and all other islands in Passamaquoddy Bay, and the island of Grand Menan, to Great Britain.

The following is the text of the report of the third of these commissions which had under consideration that portion of the northern boundary between the point where the forty-fifth parallel of north latitude strikes the St. Lawrence and the point where the boundary reaches Lake Superior:

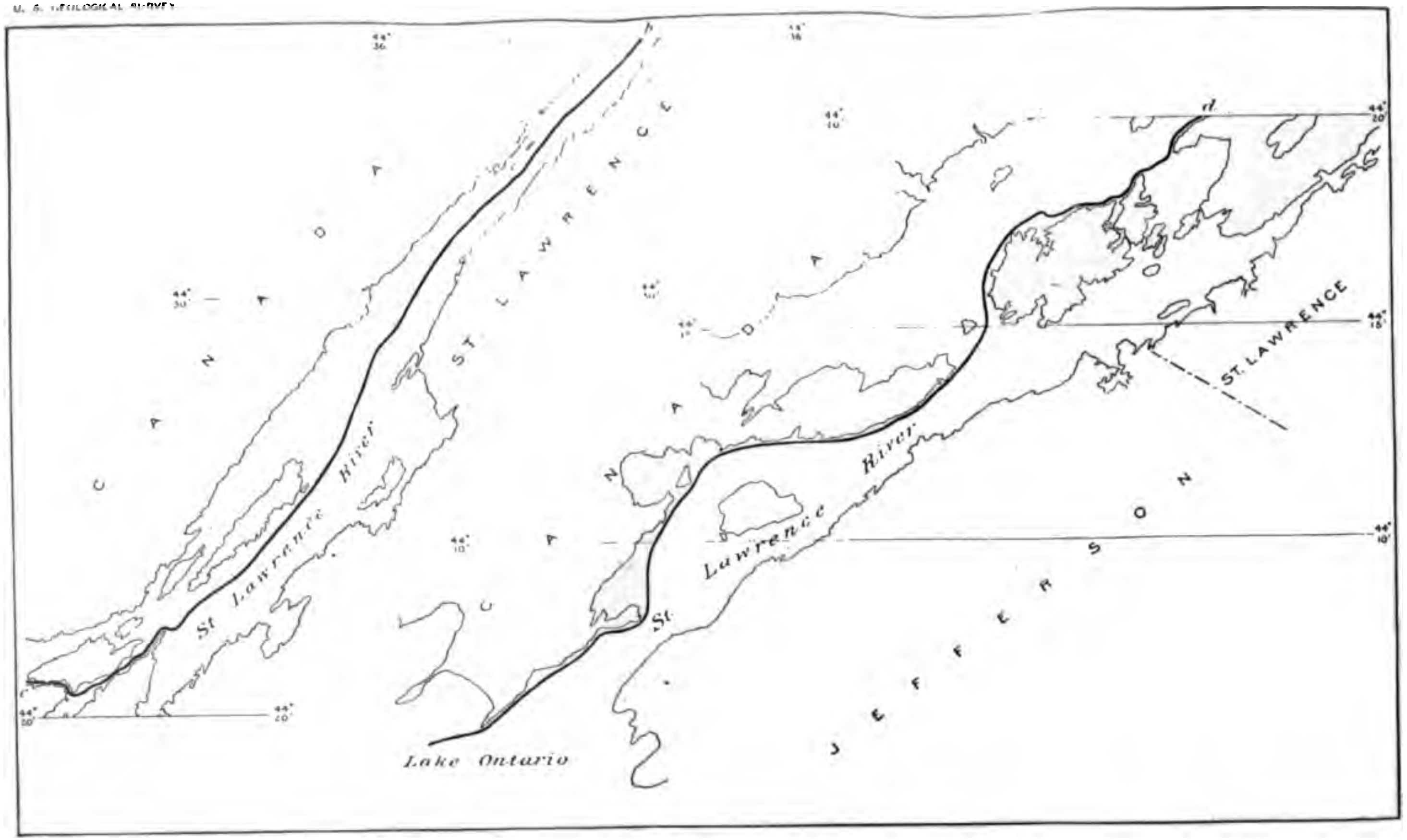
Decision of the commissioners under the sixth article of the treaty of Ghent, done at Utica, in the State of New York, 18th June, 1822.

We do decide and declare that the following-described line (which is more clearly indicated on a series of maps accompanying this report, exhibiting correct surveys and delineations of all the rivers, lakes, water communications, and islands embraced by the sixth article of the treaty of Ghent, by a black line shaded on the British side with red and on the American side with blue; and each sheet of which series of maps is identified by a certificate, subscribed by the commissioners, and by the two principal surveyors employed by them) is the true boundary intended by the two beforementioned treaties, that is to say:

Beginning at a stone monument, erected by Andrew Ellicot, esq., in the year 1817, on the south bank or shore of the said river Iroquois, or Cataraqui (now called the St. Lawrence), which monument bears south 74° 45′ west, and is 1,840 yards distant from the stone church in the Indian village of St. Regis, and indicates the point at which the forty-fifth parallel of north latitude strikes the said river; thence running north 35° 45′ west into the river, on a line at right angles with the southern shore, to a point 100 yards south of the opposite island, called Cornwall Island; thence turning westerly and passing around the southern and western sides of said island, keeping 100 yards distant therefrom, and following the curvatures of its shores, to a point opposite to the northwest corner or angle of said island; thence to and along the middle of the main river until it approaches the eastern extremity of Barnhart's Island; thence northerly along the channel which divides the last-mentioned island from the Canada shore, keeping 100 yards distant from the island, until it approaches Sheik's Island; thence along the middle of the strait which divides Barnhart's and Sheik's Islands to the channel called the Long Sault, which separates the two last-mentioned islands from the lower Long Sault Island; thence westerly (crossing the center of the last-mentioned channel) until it approaches within 100 yards of the north shore of the Lower Sault Island; thence up the north branch of the river, keeping to the north of and near the Lower Sault Island, and also north of and near the Upper Sault, sometimes called Baxter's Island, and south of the two small islands marked on the map A and B, to the western extremity of the Upper Sault or Baxter's Island; thence, passing between the two islands called the Cats, to the middle of the river above; thence along the middle of the river, keeping to the north of the small islands marked C and D, and north also of Chrystler's Island, and of the small island next above it, marked E, until it approaches the northeast angle of Goose Neck Island; thence along the passage which divides the last-mentioned island fro mthe Canada shore, keeping 100 yards from the island to the upper end of the same; thence south of and near the two small islands called the Nut Islands; thence north of and near the island marked F, and also of the island called Dry or Smuggler's Island; thence passing between the islands marked G and H to the north of the island called Isle au Rapid Platt; thence along the north side of the last-mentioned island, keeping 100 yards from the shore, to the upper end thereof; thence along the middle of the river, keeping to the south of and near the islands called Cousein (or Tussin) and Presque Isle; thence up the river, keeping north of and near the several Gallop Isles numbered on the map 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10, and also of Tick, Tibbits, and Chimney Islands, and south of and near the Gallop Isles numbered 11, 12, and 13, and also of Duck, Drummond, and Sheep Islands; thence along the middle of the river, passing north of island No. 14, south of 15 and 16, north of 17, south of 18, 19, 20, 21, 22, 23, 24, 25, and 28, and north of 26 and 27; thence along the middle of the river, north of Gull Island and of the islands Nos. 29, 32, 33, 34, 35, Bluff Island, and Nos. 39, 44, and 45, and to the south of Nos. 30, 31, 36, Grenadier Island, and Nos. 37, 38, 40, 41, 42, 43, 46, 47, and 48, until it approaches the east end of Well's Island; thence to the north of Well's Island, and along the strait which divides it



BOUNDARY BETWEEN NEW YORK AND CANADA IN ST. LAWRENCE RIVER.



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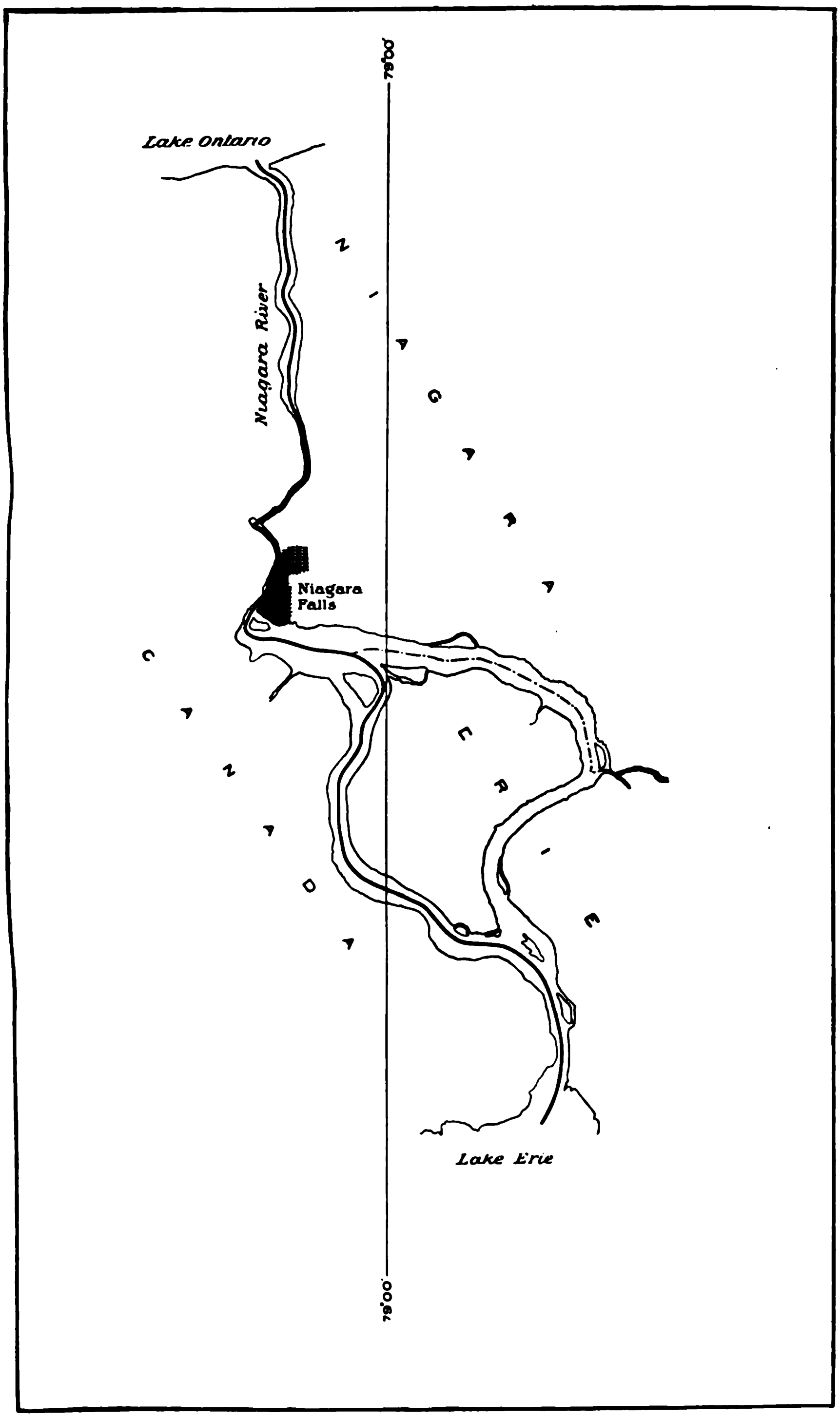


BOUNDARY BETWEEN NEW YORK AND CANADA IN NIAGARA RIVER.

from Rowe's Island, keeping to the north of the small islands Nos. 51, 52, 54, 58, 59, and 61, and to the south of the small islands numbered and marked 49, 50, 53, 55, 57, 60, and H, until it approaches the northeast point of Grindstone Island; thence to the north of Grindstone Island, and keeping to the north also of the small islands Nos. 63, 65, 67, 68, 70, 72, 73, 74, 75, 76, 77, and 78, and to the south of Nos. 62, 64, 66, 69, and 71, until it approaches the southern point of Hickory Island; thence passing to the south of Hickory Island and of the two small islands lying near its southern extremity, numbered 79 and 80; thence to the south of Grand or Long Island, keeping near its southern shore, and passing to the north of Carlton Island, until it arrives opposite to the southwestern point of said Grand Island, in Lake Ontario; thence, passing to the north of Grenadier, Fox, Stony, and the Gallop Islands, in Lake Ontario, and to the south of and near the islands called the Ducks, to the middle of the said lake; thence westerly along the middle of said lake to a point opposite the mouth of the Niagara River; thence to and up the middle of the said river to the Great Falls; thence up the Falls through the point of the Horse Shoe, keeping to the west of Iris or Goat Island, and of the group of small islands at its head, and following the bends of the river so as to enter the strait between Navy and Grand Islands; thence along the middle of said strait to the head of Navy Island; thence to the west and south of and near to Grand and Beaver Islands, and to the west of Strawberry, Squaw, and Bird Islands to Lake Erie; thence southerly and westerly along the middle of Lake Erie in a direction to enter the passage immediately south of Middle Island, being one of the easternmost of the group of islands lying in the western part of said lake; thence along the said passage, proceeding to the north of Cunningham's Island, of the three Bass Islands, and of the Western Sister, and to the south of the islands called the Hen and Chickens, and of the Eastern and Middle Sisters; thence to the middle of the mouth of the Detroit River in a direction to enter the channel which divides Bois Blanc and Sugar Islands; thence up the said channel to the west of Bois Blanc Island, and to the east of Sugar, Fox, and Stony Islands, until it approaches Fighting or Great Turkey Island; thence along the western side and near the shore of said last-mentioned island to the middle of the river above the same; thence along the middle of said river, keeping to the southeast of and near Hog Island, and to the northwest of and near the island Isle à la Pêche, to Lake Saint Clair; thence through the middle of said lake in a direction to enter that mouth or channel of the river St. Clair, which is usually denominated the Old Ship Channel; thence along the middle of said channel, between Squirrel Island on the southeast and Herson's Island on the northwest, to the upper end of the last-mentioned island, which is nearly opposite to Point au Chênes, on the American shore; thence along the middle of the river Saint Clair, keeping to the west of and near the islands called Belle Rivière Isle and the Isle aux Cerfs, to Lake Huron; thence through the middle of Lake Huron in a direction to enter the strait or passage between Drummond's Island on the west and the Little Manitou Island on the east; thence through the middle of the passage which divides the two last-mentioned islands; thence, turning northerly and westerly, around the eastern and northern shores of Drummond's Island, and proceeding in a direction to enter the passage between the island of Saint Joseph's and the American shore, passing to the north of the intermediate islands Nos. 61, 11, 10, 12, 9, 6, 4, and 2, and to the south of those numbered 15, 13, 5, and 1; thence up the said last-mentioned passage, keeping near to the island Saint Joseph's, and passing to the north and east of Isle à la Crosse and of the small islands numbered 16, 17, 18, 19, and 20, and to the south and west of those numbered 21, 22, and 23, until it strikes a line (drawn on the map with black ink and shaded on one side of the point of intersection with blue and on the other with red) passing across the river at the head of Saint Joseph's Island and at the foot of the Neebish Rapids, which line denotes the termination of the boundary directed to be run by the sixth article of the treaty of Ghent.

And the said commissioners do further decide and declare that all the islands lying in the rivers, lakes, and water communications between the before-described boundary line and the adjacent shores of Upper Canada do, and each of them does, belong to His Britannic Majesty, and that all the islands lying in the rivers, lakes, and water communications between the said boundary line and the adjacent shores of the United States or their territories do, and each of them does, belong to the United States of America, in conformity with the true intent of the second article of the said treaty of 1783, and of the sixth article of the treaty of Ghent.

In accordance with the terms of this treaty, a survey was made of the St. Lawrence and the Great Lakes, and a map prepared. This was photolithographed and published, in 29 sheets, by the United States Light-House Board, in 1891.

By the second article of the convention with Great Britain—1818—the boundary line was extended westward along the forty-ninth parallel of latitude to the "Stony" (Rocky) Mountains, while beyond these mountains the treaty provided that the country should remain open to both parties. The terms of the treaty are as follows:

ARTICLE 2. It is agreed that a line drawn from the most northwestern point of the Lake of the Woods along the forty-ninth parallel of north latitude, or if the said point shall not be in the forty-ninth parallel of north latitude, then that a line drawn from the said point due north or south, as the case may be, until the said line shall intersect the said parallel of north latitude, and from the point of such intersection due west along and with the said parallel, shall be the line of demarkation between the territories of the United States and those of His Britannic Majesty, and that the said line shall form the northern boundary of the said territories of the United States and the southern boundary of the territories of His Britannic Majesty from the Lake of the Woods to the Stony Mountains.

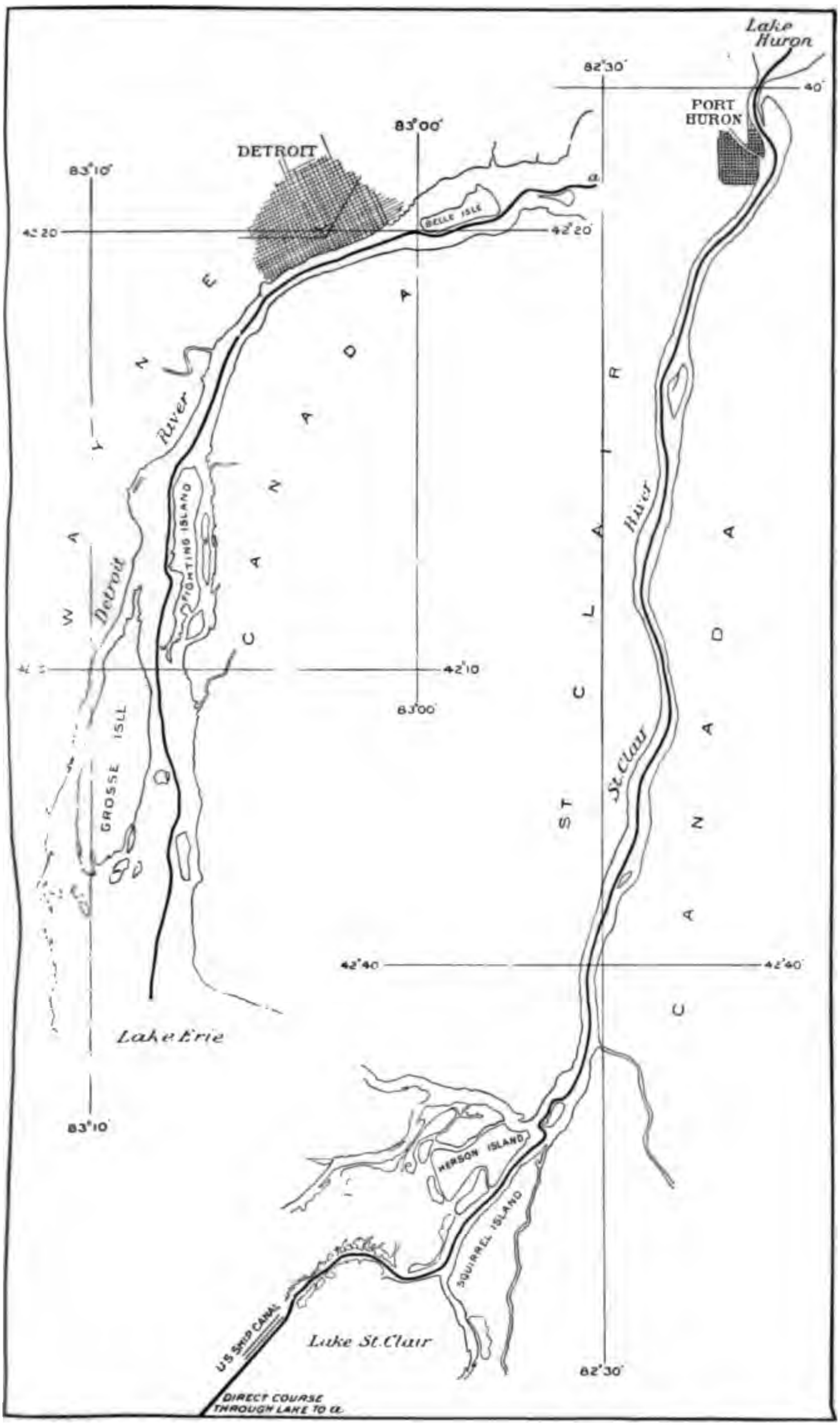
ARTICLE 3. It is agreed that any country that may be claimed by either party on the northwest coast of America, westward of the Stony Mountains, shall, together with its harbours, bays, and creeks, and the navigation of all rivers within the same, be free and open, for the term of ten years from the date of the signature of the present convention, to the vessels, citizens, and subjects of the two powers; it being well understood that this agreement is not to be construed to the prejudice of any claim which either of the two high contracting parties may have to any part of the said country, nor shall it be taken to affect the claims of any other power or state to any part of the said country; the only object of the high contracting parties in that respect being to prevent disputes and differences amongst themselves.

In 1824 negotiations were resumed between the two countries for the settlement, among other things, of the boundary west of the Rocky Mountains, but no conclusion was reached; the claim of the English Government being that the boundary line should follow the forty-ninth parallel westward to the point where this parallel strikes the great northwestern branch of Columbia River, thence down the middle of that river to the Pacific Ocean.

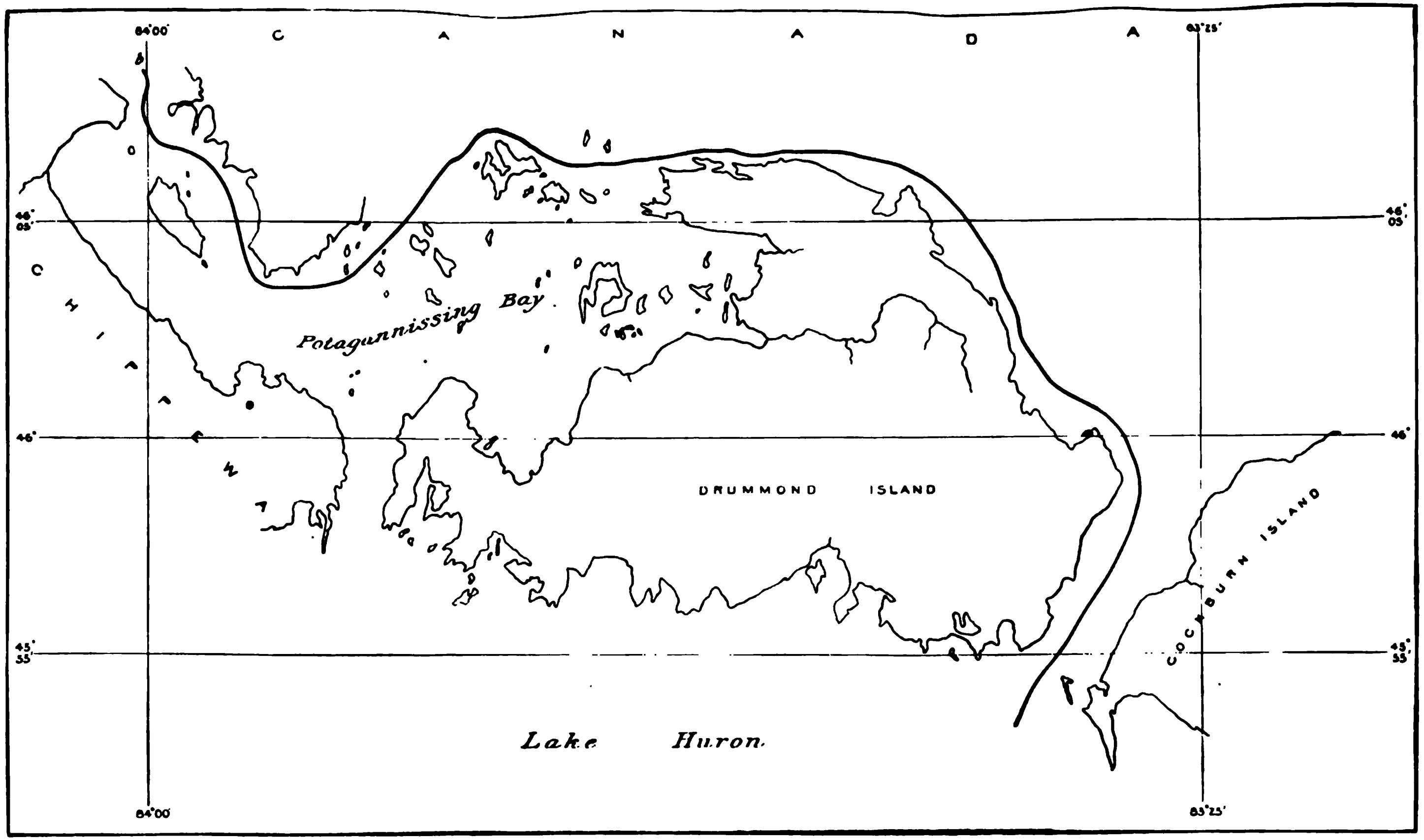
In 1826 negotiations were resumed, and several compromises were proposed by both parties, but without satisfactory results. After this the whole matter remained in abeyance until the special mission of Lord Ashburton to this country in 1842.

Meanwhile the unsettled questions regarding the northeastern boundary again came up.

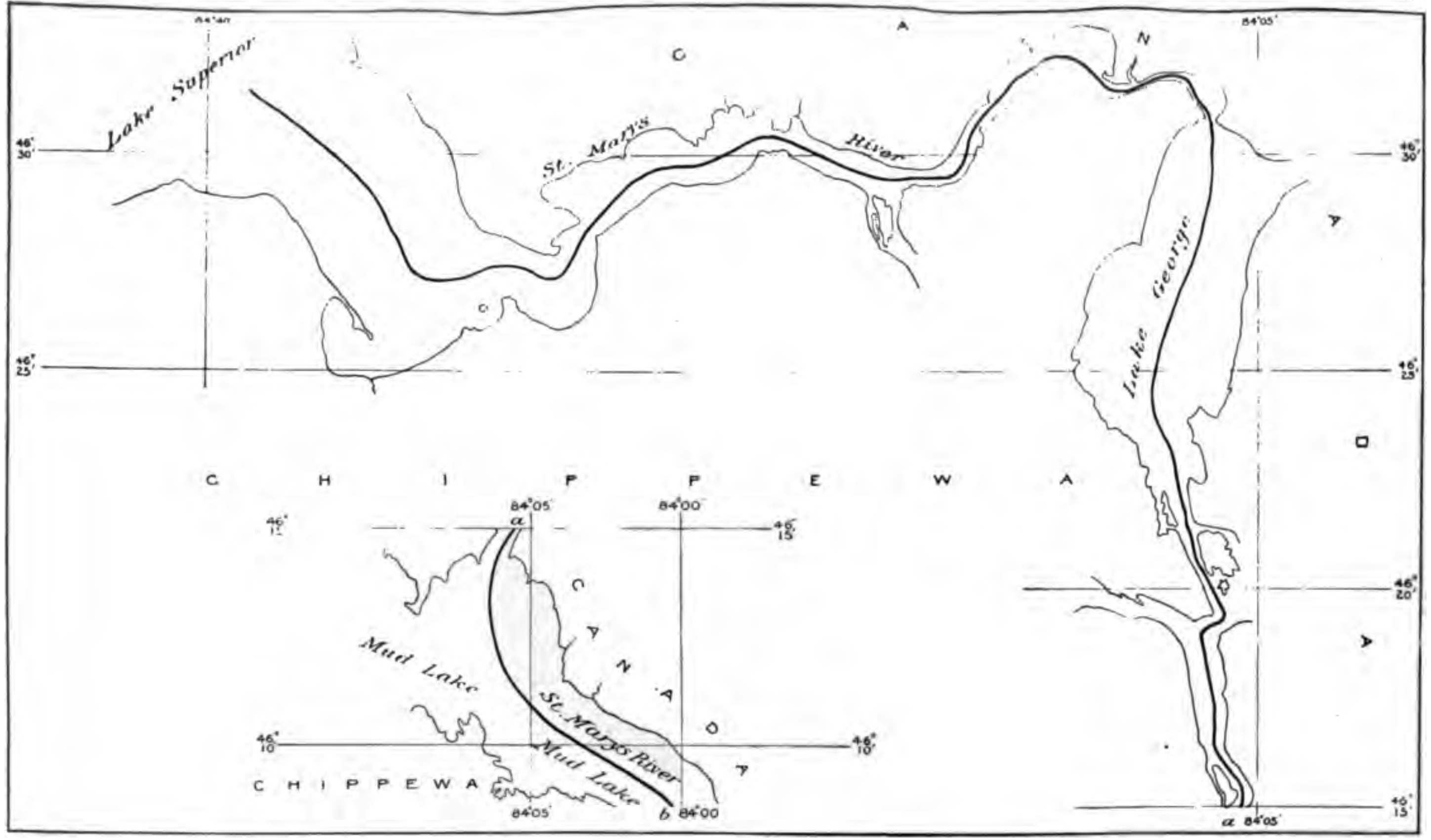
The case having reached that stage at which it became necessary to refer the points of difference to a friendly sovereign or state, the two powers found it expedient to regulate the proceedings and make provisions in relation to such reference, and on the 29th September, 1827, concluded a convention to that effect.



BOUNDARY BETWEEN UNITED STATES AND CANADA IN ST. CLAIR AND DETROIT RIVERS.



BOUNDARY BETWEEN MICHIGAN AND CANADA THROUGH ST. MARYS RIVER.



BOUNDARY BETWEEN MICHIGAN AND CANADA THROUGH ST. MARYS RIVER.

The respective claims of the United States and Great Britain were as follows, viz:

Boundary claimed by United States.—From the source of the river St. Croix (a point of departure mutually acknowledged) the boundary should be a due north line for about 140 miles, crossing the river St. John at about 75 miles. At about 97 miles it reaches a ridge or highland which divides tributary streams of the river St. John, which falls into the Bay of Fundy, from the waters of the river Ristigouche, which falls through the Bay des Chaleurs into the Gulf of St. Lawrence. In its further course the said due north line, after crossing several upper branches of the river Ristigouche, reaches, at about 140 miles, the highlands which divide the waters of the said river Ristigouche from the tributary streams of the river Metis, which falls into the river St. Lawrence.

Thence the line should run westerly and southwesterly along the highlands which divide the sources of the several rivers (from the Metis to the St. Francis) that empty themselves into the river St. Lawrence—from the sources of the tributaries of the rivers Ristigouche, St. John, Penobscot, Kennebec, and Connecticut, all which either mediately or immediately fall into the Atlantic Ocean.

Boundary claimed by Great Britain.—From the source of the river St. Croix the boundary should be a due north line about 40 miles to a point at or near Mars Hill; thence it should run westerly about 115 miles along the highlands that divide the sources of the tributaries of the river St. John from the sources of the river Penobscot to a spot called Metjarmette Portage, near the source of the river Chaudière.

From this point the line coincides with the line claimed by the United States until the northwesternmost head of the Connecticut River is reached. Great Britain claimed one of several small streams to be the northwesternmost tributary of the Connecticut River, and the United States another.

ARBITRATION BY KING OF THE NETHERLANDS.

The King of the Netherlands was selected in 1829 by the two Governments as the arbiter, and each laid before him, in conformity with the provisions of the convention, all the evidence intended to be brought in support of its claim, and two separate statements of the respective cases. These four statements, which embrace the arguments at large of each party, respectively, have been printed, but not published (1840).

The award of the King of the Netherlands, made in 1831, was as follows, viz:

* * * * * * *

We are of the opinion that it will be suitable (*il conviendra*) to adopt as the boundary of the two states a line drawn due north from the source of the river St. Croix to the point where it intersects the middle of the thalweg of the river St. John; thence the middle of the thalweg of that river, ascending it to the point where the river St. Francis empties itself into the river St. John; thence the middle of the thalweg of the river Saint Francis, ascending it to the source of its southwesternmost branch, which source we indicate on the Map A by the letter X, authenticated by the signature of our minister of foreign affairs; thence in a line drawn du west to the point where it unites with the line claimed by the United States c America and delineated on the Map A; thence said line to the point at whicl according to said map, it coincides with that claimed by Great Britain, and thenc the line traced on the map by the two powers to the northwesternmost source c Connecticut River.

* * * * * *

We are of the opinion that the stream situated farthest to the northwest, amou these which fall into the northernmost of the three lakes, the last of which beai the name of Connecticut Lake, must be considered as the northwesternmost head c Connecticut River.

* * * * * * *

We are of the opinion that it will be suitable (*il conviendra*) to proceed to fres operations to measure the observed latitude in order to mark out the boundary fron river Connecticut along the parallel of the forty-fifth degree of north latitude to th river Saint Lawrence, named in the treaties Iroquois or Cataraquy, in such a mannei however, that, in all cases, at the place called Rouse's Point the territory of the United States of America shall extend to the fort erected at that place, and shall includ said fort and its kilometrical radius (*rayon kilometrique*).

* * * * * * *

However disposed the Government of the United States might hav been to acquiesce in the decision of the arbiter, it had not the powe to change the boundaries of a State without the consent of the State Against that alteration the State of Maine entered a solemn protest b the resolutions of 19th January, 1832. And the Senate of the Unite States did accordingly refuse to give its assent to the award.

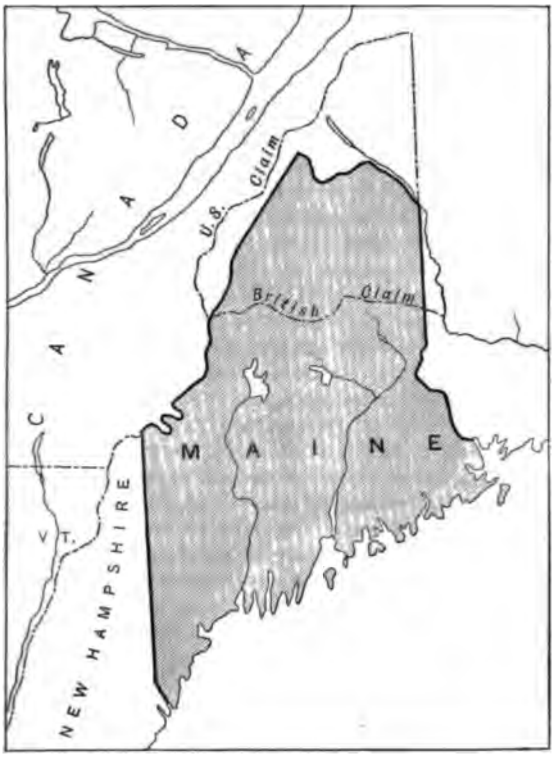
The arbitration of the King of the Netherlands having failed, fruitless negotiations ensued for a period of eleven years. Unsuccessful attempts were made to conclude an agreement preparatory to anothe arbitration. The subject became a matter of great irritation, collision occurred in the contested territory, and for a time it seemed certai that the controversy would result in war between the two powers. I 1842, however, Great Britain gave unequivocal proof of her desire fo the preservation of peace, and an amicable arrangement of the matte at issue, by the special mission of Lord Ashburton to the Unite States. The subject of this mission was the settlement, not only of th northeastern boundary, but the northern boundary west of the Rock Mountains. Regarding this object of his mission, Lord Ashburton' instructions gave as the ultimatum of the English Government th boundary as above claimed (p. 16), and, naturally, his mission had n result, as far as this portion of the boundary was concerned.

An agreement was reached, however, in regard to the northeaster boundary, which, the consent of the State of Maine having been obtained, was embodied in the treaty concluded August 9, 1842.

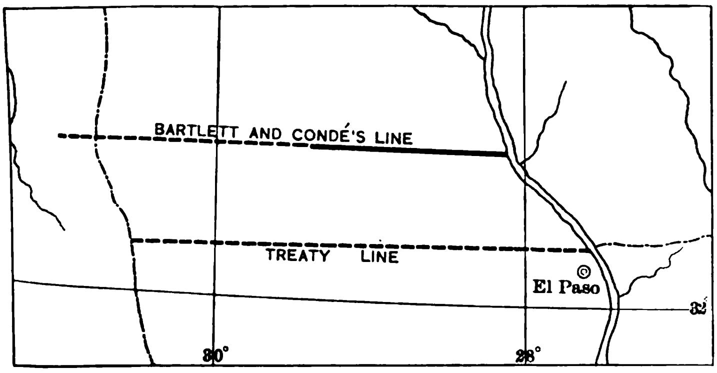
TREATY WITH GREAT BRITAIN, 1842.

The following is the text of the portion of this treaty relating to th boundary:

ARTICLE I. It is hereby agreed and declared that the line of boundary shall be a follows: Beginning at the monument at the source of the river St. Croix, as desig



NORTHERN BOUNDARY OF MAINE, SHOWING UNITED STATES AND BRITISH CLAIMS.



PORTION OF DISTURNELL'S MAP OF SOUTHWESTERN BOUNDARY, 1847 (SEE PAGES 25–26).

nated and agreed to by the commissioners under the fifth article of the treaty of 1794, between the Governments of the United States and Great Britain; thence north, following the exploring line run and marked by the surveyors of the two Governments in the years 1817 and 1818, under the fifth article of the treaty of Ghent, to its intersection with the river St. John, and to the middle of the channel thereof; thence up the middle of the main channel of the said river St. John, to the mouth of the river Saint Francis; thence up the middle of the channel of the said river St. Francis, and of the lakes through which it flows, to the outlet of the Lake Pohenagamook; thence southwesterly, in a straight line, to a point on the northwest branch of the river St. John, which point shall be ten miles distant from the main branch of the St. John, in a straight line, and in the nearest direction, but if the said point shall be found to be less than seven miles from the nearest point of the summit or crest of the highlands that divide those rivers which empty themselves into the river St. Lawrence from those which fall into the river St. John, there the said point shall be made to recede down the said northwest branch of the river St. John, to a point seven miles in a straight line from the said summit or crest; thence in a straight line, in a course about south, eight degrees west, to the point where the parallel of latitude 46° 25′ north intersects the southwest branch of the St. John's; thence southerly, by the said branch, to the source thereof in the highlands at the Metjarmette portage; thence down along the said highlands which divide the waters which empty themselves into the river Saint Lawrence from those which fall into the Atlantic Ocean, to the head of Hall's stream; thence down the middle of said stream till the line thus run intersects the old line of boundary surveyed and marked by Valentine and Collins, previously to the year 1774, as the 45th degree of north latitude, and which has been known and understood to be the line of actual division between the States of New York and Vermont on one side, and the British province of Canada on the other; and from said point of intersection, west, along the said dividing line, as heretofore known and understood, to the Iroquois or St. Lawrence River.

ARTICLE II. It is moreover agreed that, from the place where the joint commissioners terminated their labors under the sixth article of the treaty of Ghent, to-wit, at a point in the Neebish channel, near Muddy Lake, the line shall run into and along the ship channel, between St. Joseph and Saint Tammany islands, to the division of the channel at or near the head of St. Joseph's Island; thence turning eastwardly and northwardly around the lower end of St. George's or Sugar Island, and following the middle of the channel which divides St. George's from St. Joseph's Island; thence up the east Neebish channel, nearest to St. George's Island, through the middle of Lake George; thence west of Jonas' Island, into St. Mary's River, to a point in the middle of that river, about one mile above St. George's or Sugar Island, so as to appropriate and assign the said island to the United States; thence, adopting the line traced on the maps by the commissioners, through the river St. Mary and Lake Superior, to a point north of Ile Royale, in said lake, one hundred yards to the north and east of Ile Chapeau, which last mentioned island lies near the northeastern point of Ile Royale, where the line marked by the commissioners terminates; and from the last-mentioned point, southwesterly, through the middle of the sound between Ile Royale and the northwestern mainland, to the mouth of Pigeon River, and up the said river, to and through the north and south Fowl Lakes, to the lakes of the height of land between Lake Superior and the Lake of the Woods; thence along the water communication to Lake Saisaginaga, and through that lake; thence to and through Cypress Lake, Lac du Bois Blanc, Lac la Croix, Little Vermillion Lake, and Lake Namecan, and through the several smaller lakes, straits, or streams, connecting the lakes here mentioned, to that point in Lac la Pluie, or Rainy Lake, at the Chaudière Falls, from which the commissioners traced the line to the most northwestern point of the Lake of the Woods; thence, along the said line, to the said most northwestern point, being in latitude 49° 23′ 55″ north, and in longitude 95° 14′ 38″ west from the observatory at Greenwich; thence, according to existing treaties, due south to its intersection with the forty-ninth parallel of north latitude, and along that parallel to the Rocky Mountains. It being understood that all the water communications and all the usual portages along the line from Lake Superior to the Lake of the Woods, and also Grand Portage, from the shore of Lake Superior to the Pigeon River, as now actually used, shall be free and open to the use of the citizens and subjects of both countries.

* * * * * * *

ARTICLE VII. It is further agreed that the channels in the river St. Lawrence, on both sides of the Long Sault islands, and of Barnhart Island; the channels in the river Detroit, on both sides of the island Bois Blanc, and between that island and both the American and Canadian shores, and all the several channels and passages between the various islands lying near the junction of the river St. Clair with the lake of that name, shall be equally free and open to the ships, vessels, and boats of both parties.

Between 1843 and 1846 there was considerable negotiation regarding the boundary west of the Rocky Mountains, resulting finally in the Webster-Ashburton treaty, which defined the boundary as far west as the straits of Juan de Fuca. The following is that portion of the treaty which defines the boundary.

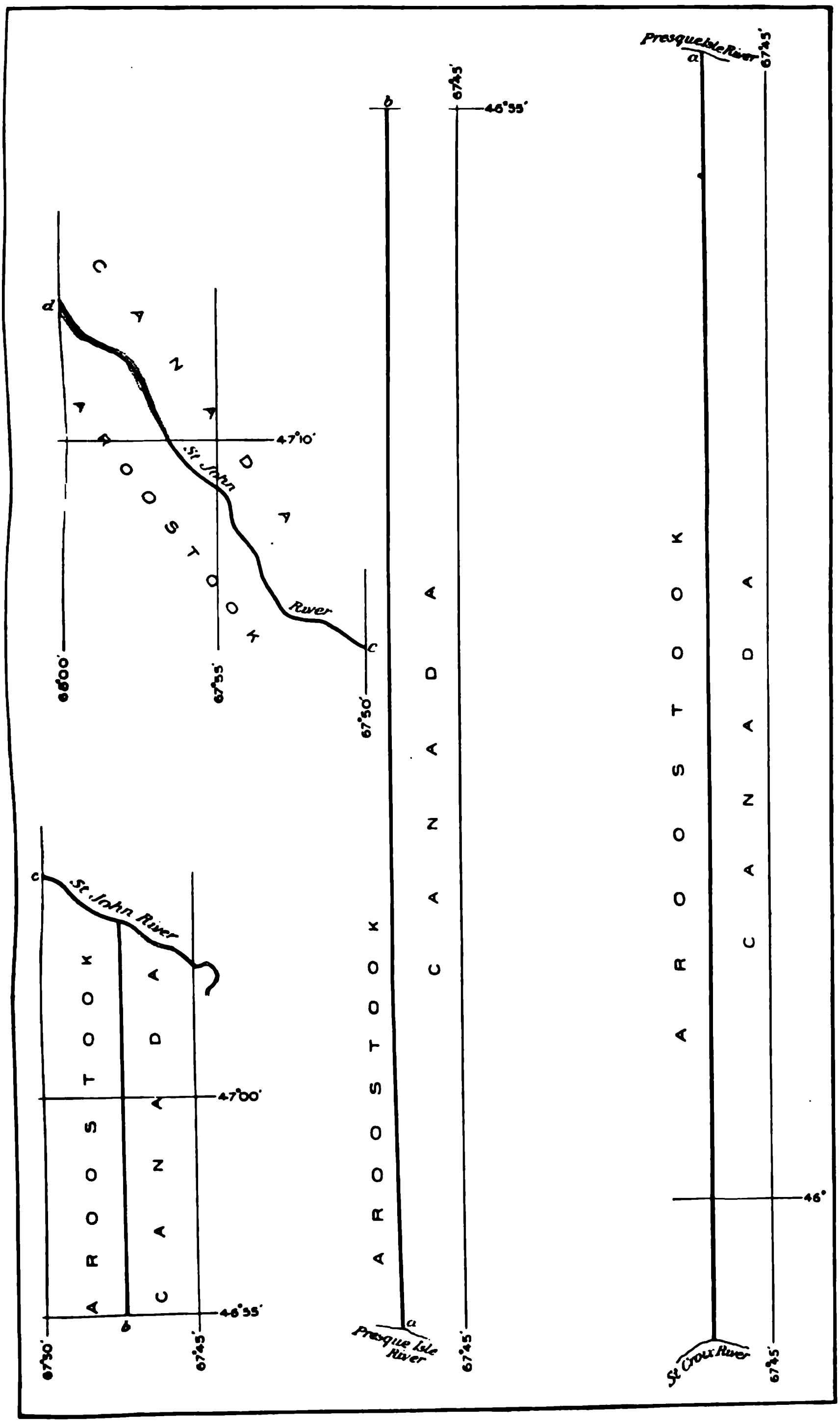
WEBSTER-ASHBURTON TREATY WITH GREAT BRITAIN, 1846.

ARTICLE I. From the point on the forty-ninth parallel of north latitude, where the boundary laid down in existing treaties and conventions between the United States and Great Britain terminates, the line of boundary between the territories of the United States and those of Her Britannic Majesty shall be continued westward along the said forty-ninth parallel of north latitude to the middle of the channel which separates the continent from Vancouver's Island, and thence southerly through the middle of the said channel, and of Fuca's Straits to the Pacific Ocean: *Provided, however*, That the navigation of the whole of the said channel and straits south of the forty-ninth parallel of north latitude remain free and open to both parties.

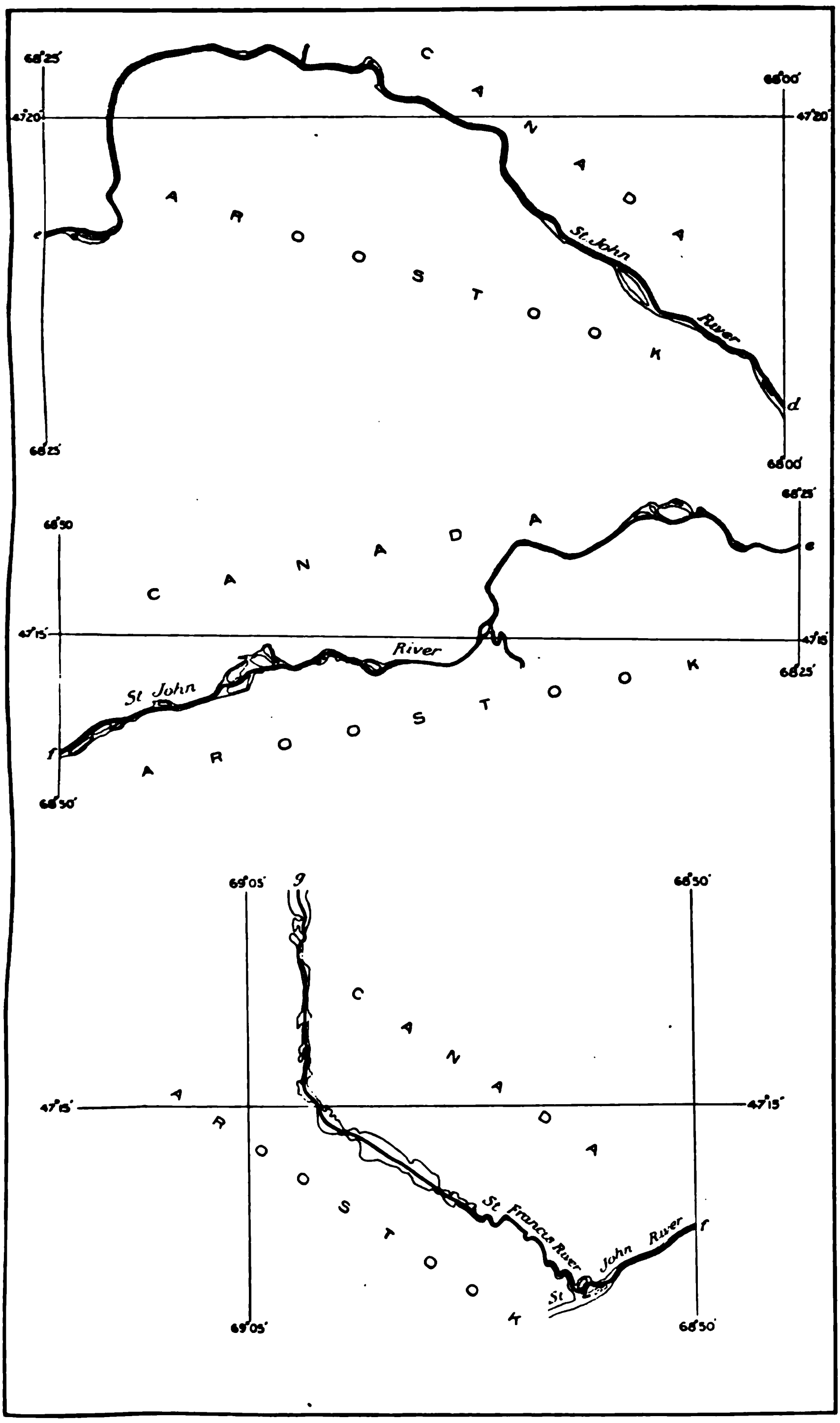
ARTICLE II. From the point at which the forty-ninth parallel of north latitude shall be found to intersect the great northern branch of the Columbia River, the navigation of the said branch shall be free and open to the Hudson's Bay Company, and to all British subjects trading with the same, to the point where the said branch meets the main stream of the Columbia, and thence down the said main stream to the ocean, with free access into and through the said river or rivers, it being understood that all the usual portages along the line thus described shall, in like manner, be free and open. In navigating the said river, or rivers, British subjects, with their goods and produce, shall be treated on the same footing as citizens of the United States; it being, however, always understood that nothing in this article shall be construed as preventing, or intending to prevent, the Government of the United States from making any regulations respecting the navigation of the said river or rivers not inconsistent with the present treaty.

The above treaty extended the line westward from the Rocky Mountains to the Pacific along the forty-ninth parallel of latitude. This settled the northern boundary with the exception of the islands and passages in the straits of Georgia and of Juan de Fuca, the English claiming that the boundary should properly run through the Rosario strait, the most eastern passage, while the United States claimed that it should naturally follow the Strait of Haro.

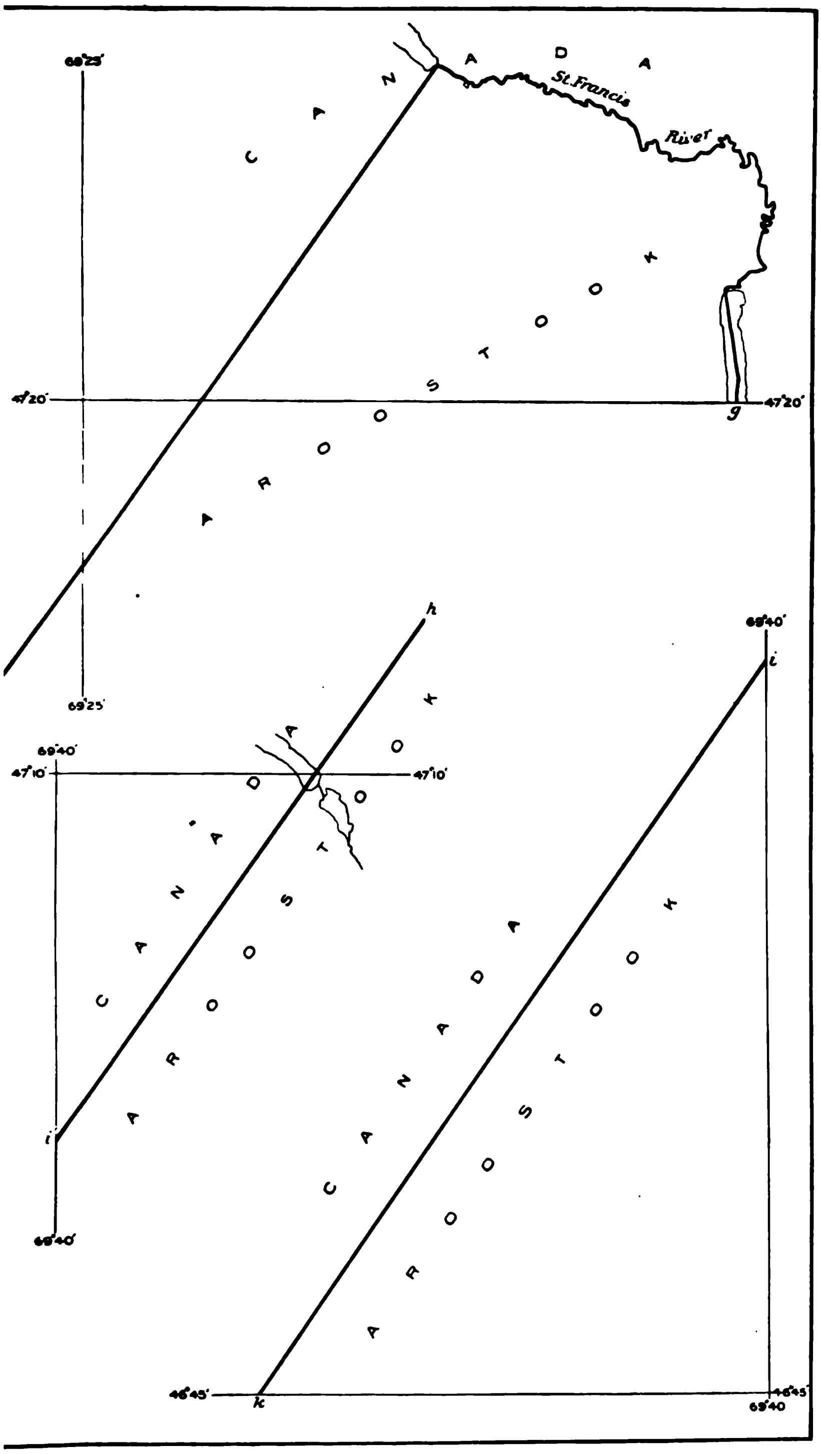
This matter was finally settled by a reference to the Emperor of Germany as an arbitrator, who decided it in favor of the United States on



BOUNDARY BETWEEN MAINE AND CANADA.



BOUNDARY BETWEEN MAINE AND CANADA.



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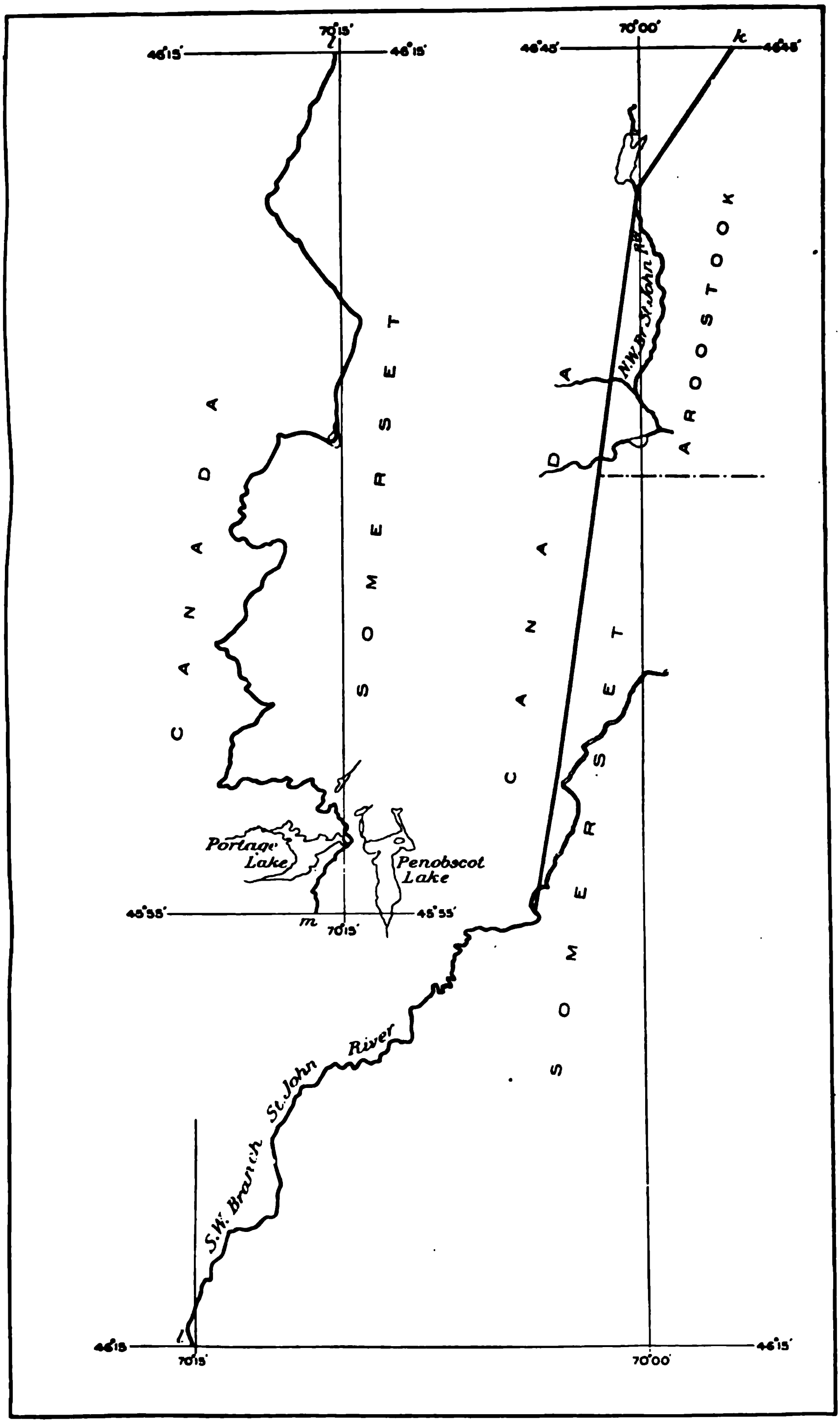
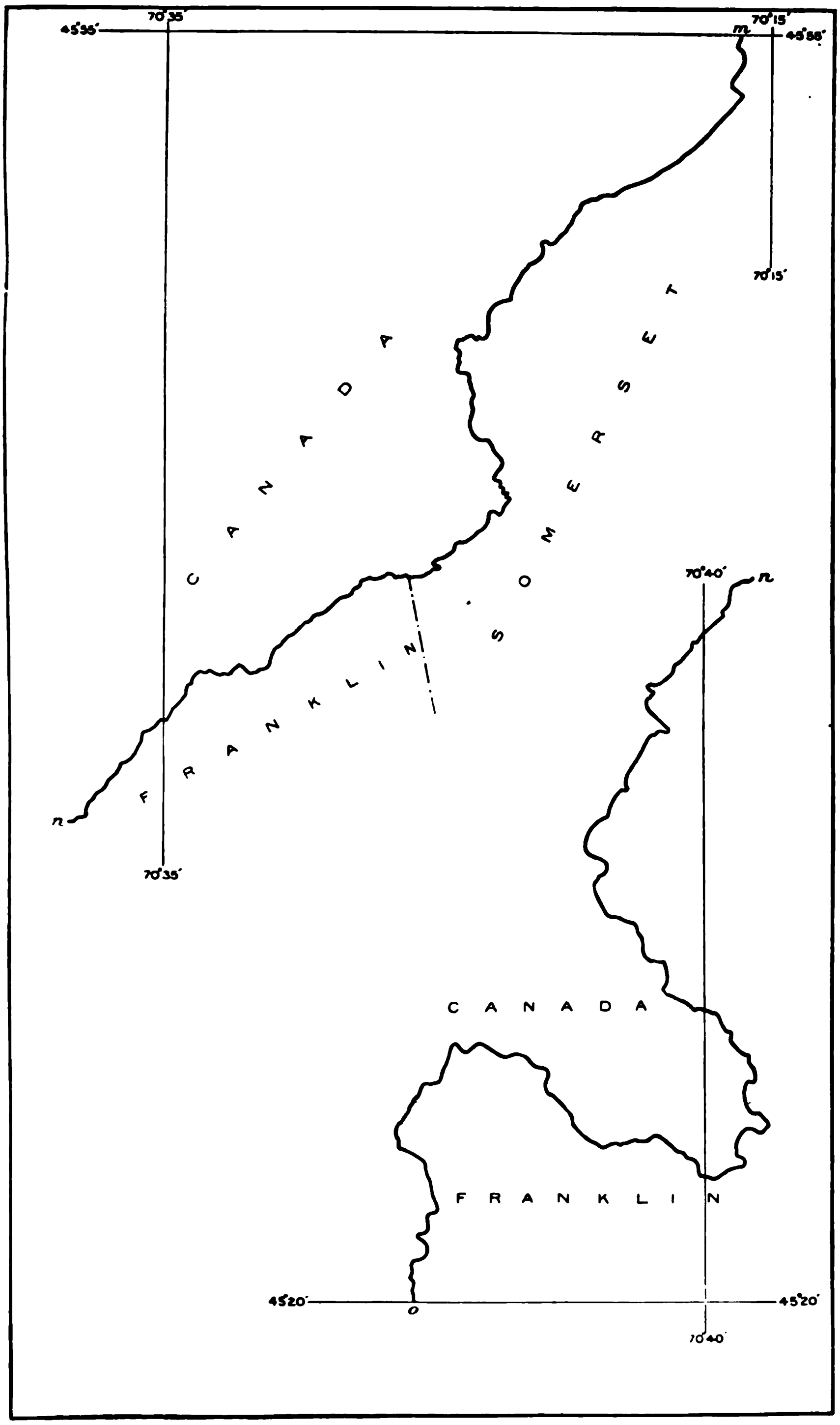
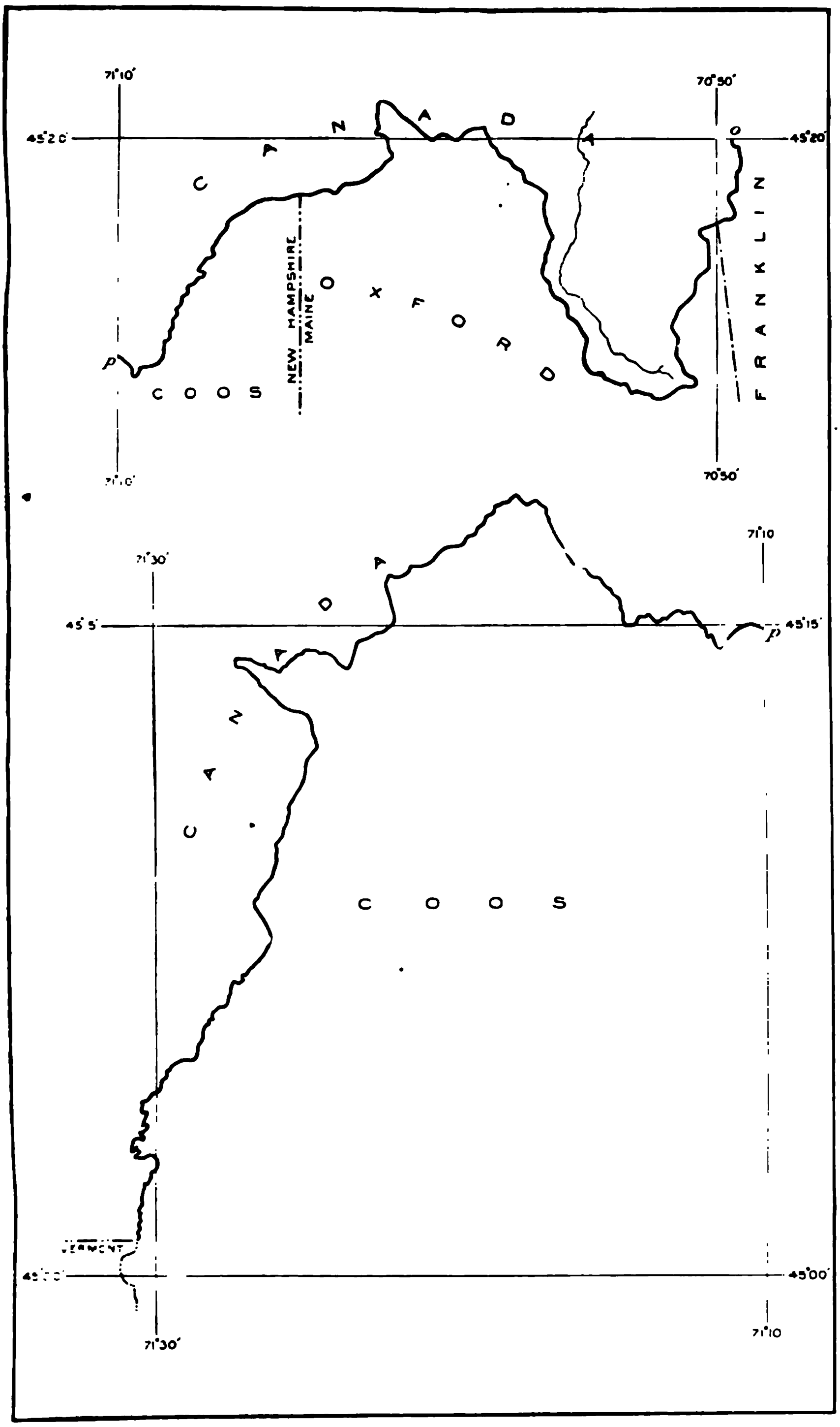


BOUNDARY BETWEEN MAINE AND CANADA.



BOUNDARY BETWEEN MAINE AND CANADA.



BOUNDARY BETWEEN MAINE, NEW HAMPSHIRE AND CANADA

the 21st of October, 1872, thus finally disposing of our boundary with Great Britain.

ADDITIONS TO THE TERRITORY OF THE UNITED STATES.

LOUISIANA PURCHASE.

The entire basin of the Mississippi, with much of the coast region of the Gulf of Mexico, which was subsequently known as the territory of Louisiana, was originally claimed by France by virtue of discovery and occupation.

In 1712 France made a grant to Antoine de Crozat, of the exclusive right to the trade of this region. As this grant makes the first, and indeed, the only, statement of the limits of this vast region, as they were understood by France, a portion of it is here introduced.

> We have by these presents signed with our hand, authorized, and do authorize the said Sieur Crozat to carry on exclusively the trade in all the territories by us possessed, and bounded by New Mexico and by those of the English in Carolina, all the establishments, ports, harbors, rivers, and especially the port and harbor of Dauphin Island, formerly called Massacre Island, the river St. Louis, formerly called the Mississippi, from the seashore to the Illinois, together with the river St. Philip, formerly called the Missouries River, and the St. Jerome, formerly called the Wabash (the Ohio), with all the countries, territories, lakes in the land, and the rivers emptying directly or indirectly into that part of the river St. Louis. All the said territories, countries, rivers, streams, and islands we will to be and remain comprised under the name of the government of Louisiana, which shall be dependent on the General Government of New France and remain subordinate to it, and we will, moreover, that all the territories which we possess on this side of the Illinois be united, as far as need be, to the General Government of New France and form a part thereof, reserving to ourself, nevertheless, to increase, if we judge proper, the extent of the government of the said country of Louisiana.

From this it appears that Louisiana was regarded by France as comprising the drainage basin of the Mississippi at least as far north as the mouth of the Illinois, with those of all its branches which enter it below this point, including the Missouri, but excluding that portion in the Southwest claimed by Spain. It is, moreover, certain that the area now comprised in Washington, Oregon, and Idaho was not included.

Crozat surrendered this grant in 1717.

On November 3, 1762, France ceded this region to Spain, defining it only as the province of Louisiana. A few months later, on February 10, 1763, by the treaty of peace between Great Britain, France, and Spain, the western boundary of the former's possessions in the New World was placed in the center of the Mississippi River, thus reducing the area of Louisiana by the portion east of the Mississippi River. Thus by these two treaties France disposed of her possessions in North America, dividing them between Great Britain and Spain. The limit set between their possessions was given as the Mississippi, the river Iberville, and lakes Maurepas and Pontchartrain.

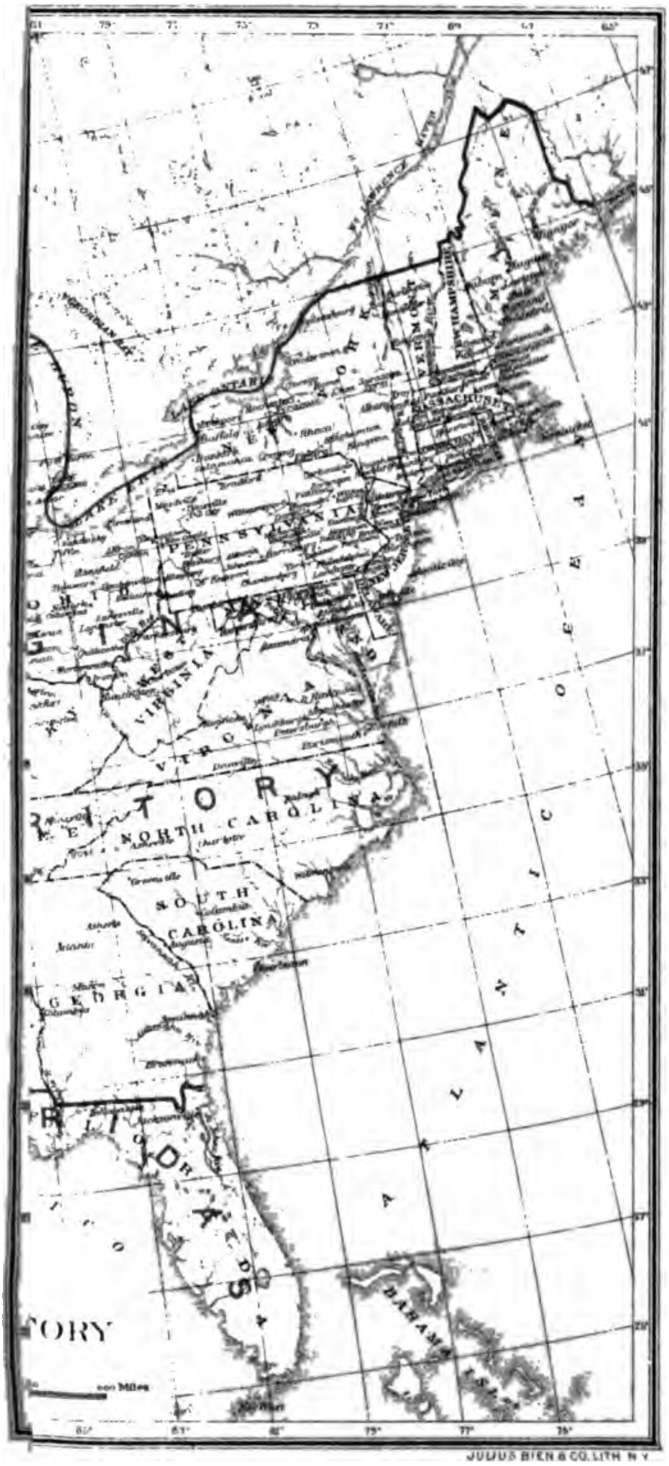
Great Britain then proceeded to subdivide her share of this territory. The area south of a meridian through the mouth of Yazoo River and west of Apalachicola River she called West Florida; the region east thereof and south of the present north boundary of Florida received the name of East Florida. For the following twenty years, i. e., up to 1783, these boundaries and names remained undisturbed. In the latter year, by the treaty of peace with the United States at the close of the Revolution, Great Britain reduced the area of West Florida by the cession of that portion north of the thirty-first parallel to the United States. In the same year she gave East Florida and what remained of West Florida to Spain, and in Spain's possession they remained until ceded to the United States in 1819.

Meantime, in 1800, by the secret treaty of San Ildefonso, Spain promised to return Louisiana to France. In the language of the treaty, she pledged herself to return to France the "Province of Louisiana, with the same extent it now has in the hands of Spain, and that it had when Spain possessed it, and such as it should be after the treaties subsequently entered into between Spain and other States."

Immediately after this transfer became known, on November 30, 1802, measures were set on foot by President Jefferson for securing in some way free access to the sea by way of the Mississippi River. Circumstances favored this negotiation. Bonaparte was at that time in almost daily expectation of a declaration of war by Great Britain, in which case the first act of the latter would be to seize the mouth of the Mississippi, and with it the province of Louisiana. Under these circumstances Bonaparte offered to sell the province to the United States, and the offer was promptly accepted. The consideration was 60,000,000 francs and the assumption by the United States of the "French spoliation claims," which were estimated to amount to $3,750,000.

The treaty of cession, which bears date April 30, 1803, describes the territory only as being the same as ceded by Spain to France by the treaty of San Ildefonso.

From this it appears that the territory sold to the United States comprised that part of the drainage basin of the Mississippi which lies west of the course of the river, with the exception of such parts as were then held by Spain. The want of precise definition of limits in the treaty was not objected to by the American commissioners, as they probably foresaw that this very indefiniteness might prove of service to the United States in future negotiations with other powers. In fact, the claim of the United States to the area now comprised in Oregon, Washington, and Idaho in the negotiations with Great Britain regarding the northwestern boundary, was ostensibly based, not only upon prior occupation and upon purchase from Spain, but also upon the alleged fact that this area formed part of the Louisiana purchase. That this claim was baseless is shown not only by what has been already detailed regarding the limits of the purchase, but also by the



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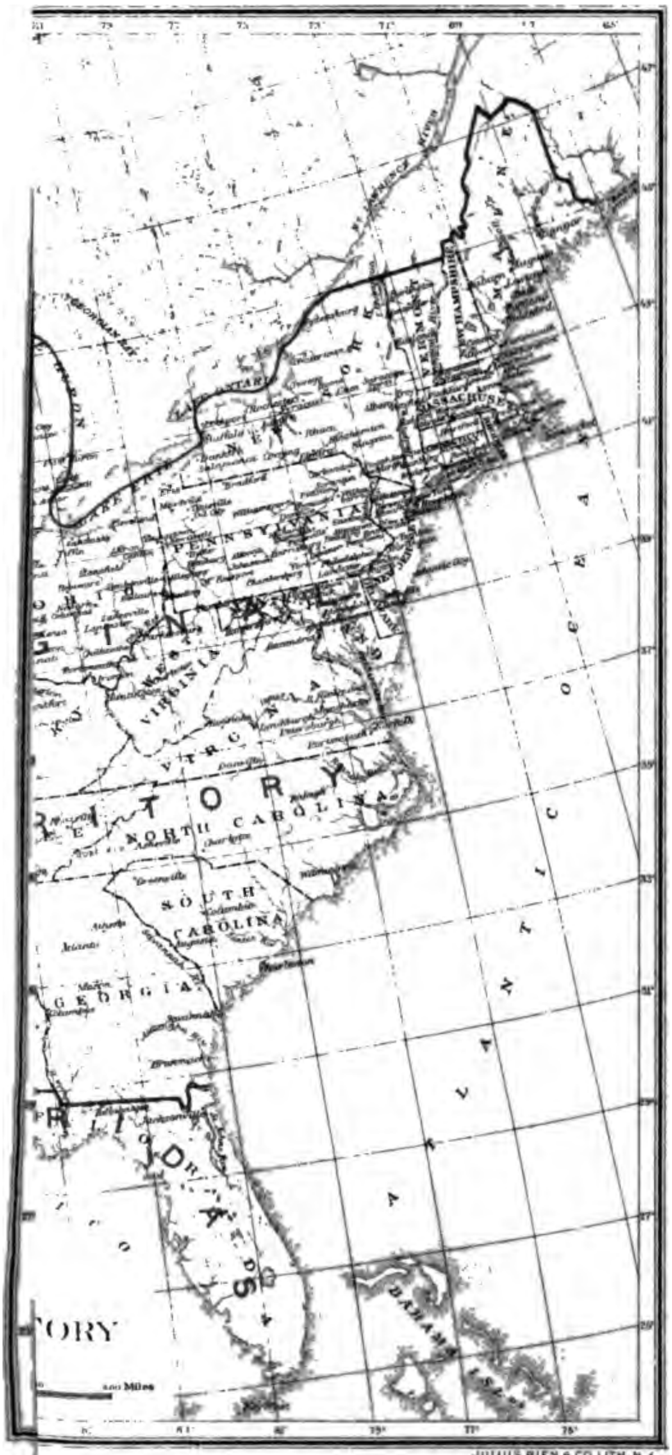

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direct testimony of the French plenipotentiary, M. Barbé Marbois. Some twenty years after the purchase he published a work upon Louisiana, in which he detailed at some length the negotiations which preceded the purchase, and, referring to this question said: "The shores of the western ocean were certainly not comprised in the cession, but already the United States are established there."

There is also contained in this work a map of the country between the Mississippi and the Pacific, on which the extent of Louisiana to the westward is indicated by a line drawn on the one hundred and tenth meridian, which is not far from the western limit of the drainage basin of the Mississippi in Wyoming and Montana. That part of the country now comprised in Oregon, Washington, and Idaho, which, it has been claimed, formed part of the purchase, bears the following legend: "Territories and countries occupied by the United States, following the treaty of cession of Louisiana."

From this it appears that the northwestern limits of the Louisiana purchase can no longer be a matter of discussion; but although the United States certainly did not purchase Oregon, as a part of Louisiana, it is no less certain that that great area west of the Rocky Mountains fell into their hands as a direct consequence of such purchase.

FLORIDA PURCHASE.

The second addition to the territory of the United States consisted of the Floridas, purchased from Spain on February 22, 1819. From the date of the Louisiana purchase, in 1803, the territory bounded by the Mississippi River on the west, the Perdido on the east, the parallel of 31° on the north, and the Gulf on the south had been in dispute between the two countries. During a part of this time it had been practically in the possession of the United States.

The clause quoted above from the treaty of San Ildefonso was interpreted by Jefferson and others in this country to mean the inclusion of West Florida. Their reasoning was this: In 1800 Spain owned West Florida; West Florida was once a part of Louisiana; in 1800 Spain re-ceded Louisiana to France; she therefore re-ceded West Florida with it.

Spain, however, held that this was merely a treaty of recession, by which she gave back to France what France had given to her in 1762. Since in 1762 she did not own West Florida, she could not, therefore, have re-ceded it to France.

As to this matter, Marbois, the French plenipotentiary, was very positive in stating that West Florida formed no part of the Louisiana purchase, and that the southeastern boundary of the latter was the river Iberville and lakes Maurepas and Pontchartrain.

Immediately after the Louisiana purchase the claim was made by the United States that it included most of West Florida, and also a part of the Texas coast, but this was not entertained by Spain. In 1810 a revolution was effected in that part of West Florida lying west of Pearl River, and application was made for annexation to the United States. The governor of Louisiana, under instructions from Washington, at once took possession, but immediately a counter revolution was organized against him, which was put down by force of arms, and in 1812 this part of West Florida was annexed to the State of Louisiana. Meantime, the insurrection spread eastward in West Florida, and, although put down by Spanish authorities, the movement received the sympathy of the United States, which passed a secret act authorizing the President, under certain specified contingencies, to use force in taking possession of the Floridas. In 1812 that portion of West Florida lying between Perdido and Pearl rivers was annexed to the Territory of Mississippi.

This purchase settled these conflicting claims.

The following is the clause in the treaty with Spain ceding the Floridas which defines the cession:

> ART. 2. His Catholic Majesty cedes to the United States, in full property and sovereignty, all the territories which belong to him, situated to the eastward of the Mississippi, known by the name of East and West Florida, the adjacent islands dependent upon said province, etc.

A further article in this treaty defines the boundary between the United States and the Spanish possessions in the Southwest, as follows:

> The boundary line between the two countries, west of the Mississippi, shall begin on the Gulf of Mexico, at the mouth of the river Sabine, in the sea, continuing north, along the western bank of that river, to the thirty-second degree of latitude, thence by a line due north to the degree of latitude where it strikes the Rio Roxo of Nachitoches, or Red River; then following the course of the Rio Roxo to the degree of longitude 100 west from London, or about 23° west of Washington; then crossing the said Rio Roxo and running thence, by a line due north, to the River Arkansas; thence, following the course of the southern bank of the Arkansas, to its source in latitude 42 north; and thence by that parallel of latitude to the South Sea, the whole being as laid down in Melish's map of the United States, published at Philadelphia, improved to the 1st of January, 1818. But if the source of the Arkansas River shall be found to fall north or south of latitude 42, then the line shall run from the said source due south or north, as the case may be, till it meets the said parallel of latitude 42, and thence along the said parallel to the South Sea, all the islands in the Sabine and the said Red and Arkansas rivers, throughout the course thus described, to belong to the United States; but the use of the waters, and the navigation of the Sabine to the sea, and of the said rivers Roxo and Arkansas throughout the extent of the said boundary on their respective banks shall be common to the respective inhabitants of both nations.

TEXAS ACCESSION.

The next acquisition of territory was that of the Republic of Texas, which was admitted as a State on December 29, 1845. The area which Texas brought into the Union was limited as follows, as defined by the Republic of Texas, December 19, 1836:

> Beginning at the mouth of the Sabine River and running west along the Gulf of Mexico three leagues from land to the mouth of the Rio Grande, thence up the principal stream of that river to its source, thence due north to the forty-second degree of north latitude, thence along the boundary line as defined in the treaty between Spain and the United States, to the beginning.

FIRST MEXICAN CESSION.

n 1848 a further addition was made to our territory by the treaty of adalupe-Hidalgo. This added to the country the area of California, vada, Utah, and parts of Colorado, Arizona, and New Mexico, while Gadsden purchase, which was effected in 1853, added the remainder Arizona and another part of New Mexico.

he treaty of Guadalupe-Hidalgo was concluded February 2, 1848, l proclaimed July 4, 1848. The clauses in it defining our acquisition territory are as follows:

RTICLE V. The boundary line between the two Republics shall commence in the f of Mexico, three leagues from land, opposite the mouth of the Rio Grande, erwise called the Rio Bravo del Norte, or opposite the mouth of its deepest branch, t should have more than one branch emptying into the sea; from thence up the ldle of that river, following the deepest channel where it has more than one, to the nt where it strikes the southern boundary of New Mexico; thence westwardly ng the whole southern boundary of New Mexico (which runs north of the town led Paso) to its western termination; thence northward along the western line of w Mexico until it intersects the first branch of the river Gila (or if it should not rsect any branch of that river, then to the point on the said line nearest to such nch, and thence in a direct line to the same); thence down the middle of the said nch and of the said river until it empties into the Rio Colorado; thence across the Colorado, following the division line between Upper and Lower California, to the ific Ocean.

he southern and western limits of New Mexico, mentioned in this article, are those l down in the map entitled, "Map of the United Mexican States as organized and ned by various acts of the Congress of said Republic, and constructed according he best authorities. Revised edition. Published at New York, in 1847, by J. Disnell;" of which map a copy is added to this treaty, bearing the signatures and ls of the undersigned plenipotentiaries. And in order to preclude all difficulty in cing upon the ground the limit separating Upper from Lower California, it is eed that the said limit shall consist of a straight line drawn from the middle of Rio Gila, where it unites with the Colorado, to a point on the coast of the Pacific an, distant one marine league due south of the southernmost point of the port of Diego, according to the plan of said port made in the year 1782, by Don Juan toja, second sailing master of the Spanish fleet, and published at Madrid in the r 1802, in the atlas to the voyage of the schooners Sutil and Mexicana; of which n a copy is hereunto added, signed, and sealed by the respective plenipotentiaries.

Much difficulty followed in the interpretation of this treaty. A joint nmission of the two Governments was formed, consisting of a comssioner and a chief surveyor from each. They were instructed that y decision upon the interpretation of the treaty must be agreed to animously. The most important question coming before the commisn for decision concerned the location and extent of the south bound- of New Mexico. Here, unfortunately, the Disturnell map left room broad difference in opinion. The town called Paso is incorrectly ated upon the map to the extent of nearly half a degree of latitude, in other words, the parallels of latitude are misplaced to this extent, that if the position of the south boundary of New Mexico be accepted th reference to the nearest parallel of latitude, it is half a degree ther north than it would be if its position were measured from the wn of Paso.

In the absence of the chief surveyor the other three members of the commission, including Mr. J. R. Bartlett, United States commissioner, agreed to accept the position of the south boundary of New Mexico as shown by the projection lines of the map; to run a line in this latitude 3 degrees west from the Rio Grande, and from the end of this line to run north until a branch of Gila River was intersected. In accordance with this decision a durable monument was erected on the bank of the Rio Grande, in latitude 32° 22′, and the line was run a degree and a half to the westward. At this time the chief surveyor arrived, learned what had been done, and made a vigorous protest against this interpretation of the map. This protest, backed by Major Emory, the chief astronomer, caused a sudden stoppage of the work of running the line and the repudiation of the agreement by the United States Government. Negotiations followed, but no agreement was reached until in 1853 the whole matter was taken out of court by the Gadsden purchase.

GADSDEN PURCHASE.

Subsequently, on December 30, 1853, a second purchase was made of Mexico, consisting of the strip of land lying south of the Gila River, in New Mexico and Arizona. The boundaries as established by this, known as the Gadsden purchase, were as follows:

> ARTICLE I. The Mexican Republic agrees to designate the following as her true limits with the United States for the future: Retaining the same dividing line between the two Californias as already defined and established, according to the fifth article of the treaty of Guadalupe-Hidalgo, the limits between the two Republics shall be as follows: Beginning in the Gulf of Mexico, three leagues from land, opposite the mouth of the Rio Grande, as provided in the fifth article of the treaty of Guadalupe-Hidalgo; thence, as defined in the said article, up the middle of that river to the point where the parallel of 31° 47′ north latitude crosses the same; thence due west one hundred miles; thence south to the parallel of 31° 20′ north latitude; thence along the said parallel of 31° 20′ to the one hundred and eleventh meridian of longitude west of Greenwich; thence in a straight line to a point on the Colorado River twenty English miles below the junction of the Gila and Colorado rivers; thence up the middle of the said river Colorado until it intersects the present line between the United States and Mexico.

In the year following a commission was appointed for surveying and marking this line, under the United States commissioner, Maj. W. H. Emory. The line was run and marked in the year 1855, and the report was transmitted in the following year.

As settlement increased in the territory which this line traverses the fact was developed that the line was insufficiently marked. Some of the monuments had disappeared and in many places there were great extents of country in which no monuments had ever been placed, so that the necessity became apparent for rerunning and marking of the line. For this purpose a commission was created in 1891, the United States members of which were Col. J. W. Barlow and Capt. D. D. Gaillard, Corps of Engineers, U. S. A., and Mr. A. T. Mosman of the United States Coast and Geodetic Survey. Under this commission the line was recovered from the original monuments as far as possible, and between these monuments was rerun and fully and durably marked. The report, with maps, profiles, and illustrations of the monuments, was published in 1899.

ALASKA PURCHASE.

Alaska was purchased from Russia, the treaty of purchase having been signed on March 30, 1867, and proclaimed June 20, 1867. The boundaries of the territory are described in the accompanying quotation from the treaty:

> Commencing from the southernmost point of the island called Prince of Wales Island, which point lies in the parallel of 54° 40′ north latitude, and between the one hundred and thirty-first and one hundred and thirty-third degree of west longitude (meridian of Greenwich), the said line shall ascend to the north along the channel called Portland Channel as far as the point of the continent where it strikes the fifty-sixth degree of north latitude; from this last-mentioned point the line of demarkation shall follow the summit of the mountains situated parallel to the coast as far as the point of intersection of the one hundred and forty-first degree of west longitude (of the same meridian); and, finally, from the said point of intersection the said meridian line of the one hundred and forty-first degree in its prolongation as far as the Frozen Ocean.
>
> IV. With reference to the line of demarkation laid down in the preceding article it is understood—
>
> 1st. That the island called Prince of Wales Island shall belong wholly to Russia (now, by this cession, to the United States).
>
> 2d. That whenever the summit of the mountains which extend in a direction parallel to the coast from the fifty-sixth degree of north latitude to the point of intersection of the one hundred and forty-first degree of west longitude shall prove to be at the distance of more than ten marine leagues from the ocean, the limit between the British possessions and the line of coast which is to belong to Russia, as above mentioned (that is to say, the limit to the possessions ceded by this convention), shall be formed by a line parallel to the winding of the coast, and which shall never exceed the distance of ten marine leagues therefrom.
>
> The western limit within which the territories and dominion conveyed are contained passes through a point in Behring's Straits on the parallel of 65° 30′ north latitude at its intersection by the meridian which passes midway between the islands of Krusenstern or Ignalook and the island of Ratmanoff or Noonerbook, and proceeds due north without limitation into the same Frozen Ocean.
>
> The same western limit, beginning at the same initial point, proceeds thence in a course nearly southwest through Behring's Straits and Behring's Sea, so as to pass midway between the northwest point of the island of Saint Lawrence and the southeast point of Cape Choukotski to the meridian of one hundred and seventy-two west longitude; thence from the intersection of that meridian in a southwesterly direction, so as to pass midway between the island of Attore and the Copper Island of the Kormandorski couplet or group, in the North Pacific Ocean, to the meridian of one hundred and ninety-three degrees west longitude, so as to include in the territory conveyed the whole of the Aleutian Islands west of that meridian.

The consideration paid for Alaska was $7,200,000 in gold.

There is no possibility of a misinterpretation of the language of the above treaty concerning the portion of the boundary running along the one hundred and forty-first meridian from the shores of the Arctic Ocean to the neighborhood of the coast near Mount St. Elias, and in recent years points upon this boundary, notably at the crossing of the Yukon, have been established by the United States and Canadian surveyors by astronomic means and marked.

Concerning the remaining portion of the boundary, however, from the neighborhood of Mount St. Elias southeastward to the mouth of Portland Canal, question has been raised in recent years by Canadian authorities.

It has long been known that the coast of this part of Alaska is extremely broken, containing many fiords extending far inland, and that no continuous range of mountains parallels the coast. It was for many years tacitly admitted by both sides that the second alternative of the treaty, that the boundary should follow a line 10 marine leagues distant from the coast and following its windings, should be the one finally adopted when the question of marking the boundary arose. This position was taken by the United States and consistently followed from the time of the acquisition of the territory to the present. All maps, United States and Canadian, agreed on it. Many acts of sovereignty were performed by the United States within this territory, no question being raised by the Canadian authorities, and the claim of the United States to a strip of territory 10 marine leagues in width from the main coast was universally admitted by the Canadian authorities. The discovery of gold in the basin of the Yukon, in Canada, and the fact that the only feasible means of access to this region lay through United States territory, made it extremely desirable for Canada to possess a port or ports on this coast as the starting points of routes to the Yukon mines, and it was only when this necessity appeared that any question arose concerning the interpretation of the definition of limits in the treaty.

The claim made by the British Government, before a joint commission on the boundary, on behalf of Canada, in August, 1898, was that this portion of the boundary, instead of passing up Portland Canal, should pass up Pearse Canal, connecting with Portland Canal, up which it follows to the summit of the mountains nearest to the coast, and then should follow them, regardless of the fact that they do not form a continuous range, crossing all the inlets of the sea up to Mount St. Elias. This, of course, was refused by the United States commissioners. A proposition made by the British commissioners to refer the matter to arbitration was also refused by the United States commissioners, on the ground that there was nothing to arbitrate, since the territory in question was in the possession of the United States, and had been for many years without dispute, such possession being in full accord with the terms of the treaty. The commission was then dissolved, the only outcome being an agreement that the summits of White and Chilkoot passes and a point upon the Chilkat, above Pyramid Harbor, were temporarily adopted as points upon the boundary.

HAWAIIAN ISLANDS.

The Republic of Hawaii, comprising eight islands in the Pacific, voluntarily joined the United States in 1898.

PORTO RICO, GUAM, AND PHILIPPINE ISLANDS.

The latest accession of territory made by the United States were the islands taken from Spain following the war of 1898. These were relinquished to the United States by the treaty of peace of December 10, 1898. They were as follows:

Cuba, sovereignty over which was relinquished by Spain and assumed by the United States. With Cuba was included the Isle of Pines and the islets scattered around the Cuban coast.

Porto Rico and other Spanish West India islands which were ceded to the United States.

The island of Guam, in the Ladrones.

The Philippine Islands, which comprise all the islands lying within the following line, as defined in the words of the treaty:

> A line running from west to east along or near the twentieth parallel of north latitude, and through the middle of the navigable channel of Bachi, from the one hundred and eighteenth (118th) to the one hundred and twenty-seventh (127th) degree meridian of longitude east of Greenwich; thence along the one hundred and twenty-seventh (127th) degree meridian of longitude east of Greenwich to the parallel of four degrees and forty-five minutes (4° 45′) north latitude; thence along the parallel of four degrees and forty-five minutes (4° 45′) north latitude to its intersection with the meridian of longitude one hundred and nineteen degrees and thirty-five minutes (119° 35′) east of Greenwich; thence along the meridian of longitude one hundred and nineteen degrees and thirty-five minutes (119° 35′) east of Greenwich to the parallel of latitude seven degrees and forty minutes (7° 40′) north; thence along the parallel of latitude seven degrees and forty minutes (7° 40′) north to its intersection with the one hundred and sixteenth (116th) degree meridian of longitude east of Greenwich; thence by a direct line to the intersection of the tenth (10th) degree parallel of north latitude with the one hundred and eighteenth (118th) degree meridian of longitude east of Greenwich; and thence along the one hundred and eighteenth (118th) degree meridian of longitude east of Greenwich to the point of beginning.

For the Philippines the sum of $20,000,000 was paid by the United States to Spain.

CHAPTER II.

THE PUBLIC DOMAIN AND AN OUTLINE OF THE HISTORY OF CHANGES MADE THEREIN.

CESSIONS BY THE STATES.

At the time the Constitution was adopted by the original thirteen States, many of them possessed unoccupied territory, in some cases entirely detached and lying west of the Appalachian Mountains. Thus, Georgia included the territory from its present eastern limits westward to the Mississippi River. North Carolina possessed a narrow strip extending from latitude 35° to 36° 30′, approximately, and running westward to the Mississippi, including besides its own present area that of the present state of Tennessee. In like manner, Virginia possessed what is now Kentucky, while a number of States, as Pennsylvania, New York, Massachusetts, and Connecticut, laid claim to areas in what was afterward known as the Territory Northwest of the River Ohio, a region which is now comprised mainly in the States of Ohio, Indiana, Illinois, Michigan, and Wisconsin. These claims were to a greater or less extent conflicting. In some cases several States claimed authority over the same area, while the boundary lines were in most cases very ill-defined.

The ownership of these western lands by individual States was opposed by those States which did not share in their possession, mainly on the ground that the resources of the General Government, to which all contributed, should not be taxed for the protection and development of this region, while its advantages would inure to the benefit of but a favored few. On this ground several of the States refused to ratify the Constitution until this matter had been settled by the cession of these tracts to the General Government.

Moved by these arguments, as well as by the consideration of the conflicting character of the claims, which must inevitably lead to trouble among the States, Congress passed, on October 30, 1779, the following act:

Whereas the appropriation of the vacant lands by the several States during the present war will, in the opinion of Congress, be attended with great mischiefs: Therefore,

Resolved, That it be earnestly recommended to the State of Virginia to reconsider their late act of assembly for opening their land office; and that it be recommended to the said State, and all other States similarly circumstanced, to forbear settling or issuing warrants for unappropriated lands, or granting the same during the continuance of the present war.

This resolution was transmitted to the different States. The first to respond to it by the transfer of her territory to the General Government was New York, whose example was followed by the other States.

These cessions were made on the dates given below:

New York, March 1, 1781.

Virginia, March 1, 1784.

Massachusetts, April 19, 1785

Connecticut, September 13, 1786.

The Connecticut act of cession reserved an area in the northeastern part of Ohio, known as the Western Reserve. On May 30, 1800, Connecticut gave to the United States jurisdiction over this area, but without giving up its property rights in it.

South Carolina, August 9, 1787.

North Carolina, February 25, 1790.

Georgia, April 24, 1802.

The following paragraph from the deed of cession by New York defines the limits of its cession to the General Government:

> Now, therefore, know ye, that we, the said James Duane, William Floid, and Alexander M'Dougall, by virtue of the power and authority, and in the execution of the trust reposed in us, as aforesaid, have judged it expedient to limit and restrict, and we do, by these presents, for and in behalf of the said State of New York, limit and restrict the boundaries of the said State in the western parts thereof, with respect to the jurisdiction, as well as the right or pre-emption of soil, by the lines and in the form following, that is to say: a line from the northeast corner of the State of Pennsylvania, along the north bounds thereof to its northwest corner, continued due west until it shall be intersected by a meridian line to be drawn from the forty-fifth degree of north latitude, through the most westerly bent or inclination of Lake Ontario; thence by the said meridian line to the forty-fifth degree of north latitude; and thence by the said forty-fifth degree of north latitude; but if, on experiment, the above-described meridian line shall not comprehend twenty miles due west from the most westerly bent or inclination of the river or strait of Niagara, then we do, by these presents, in the name of the people, and for and on behalf of the State of New York, and by virtue of the authority aforesaid, limit and restrict the boundaries of the said State in the western parts thereof, with respect to jurisdiction, as well as the right of pre-emption of soil, by the lines and in the manner following, that is to say: a line from the northeast corner of the State of Pennsylvania, along the north bounds thereof, to its northwest corner, continued due west until it shall be intersected by a meridian line, to be drawn from the forty-fifth degree of north latitude, through a point twenty miles due west from the most westerly bent or inclination of the river or strait Niagara; thence by the said meridian line to the forty-fifth degree of north latitude, and thence by the said forty-fifth degree of north latitude.

The deed of cession by Virginia gives no limits, further than to specify that the lands transferred include only those lying northwest of the river Ohio.

The following paragraph from the deed of cession by Massachusetts gives the limits of the area ceded:

> * * * We do by these presents assign, transfer, quitclaim, cede, and convey to the United States of America, for their benefit, Massachusetts inclusive, all right, title, and estate of and in, as well the soil as the jurisdiction, which the said Com-

monwealth hath to the territory or tract of country within the limits of Massachusetts charter situate and lying west of the following line, that is to say, a meridian line to be drawn from the forty-fifth degree of north latitude through the westerly bent or inclination of Lake Ontario, thence by the said meridian line to the most southerly side line of the territory contained in the Massachusetts charter; but if on experiment the above-described meridian line shall not comprehend twenty miles due west from the most westerly bent or inclination of the river or strait of Niagara, then we do by these presents, by virtue of the power and authority aforesaid, in the name and on behalf of the said Commonwealth of Massachusetts, transfer, quitclaim, cede, and convey to the United States of America, for their benefit, Massachusetts inclusive, all right, title, and estate of and in as well the soil as the jurisdiction, which the said Commonwealth hath to the territory or tract of country within the limits of the Massachusetts charter, situate and lying west of the following line, that is to say, a meridian line to be drawn from the forty-fifth degree of north latitude through a point twenty miles due west from the most westerly bent or inclination of the river or strait of Niagara; thence by the said meridian line to the most southerly side line of the territory contained in the Massachusetts charter aforesaid.

The following clause from the act of the legislature of Connecticut, authorizing the cession, defines its limits:

Be it enacted * * * That the delegates of this State, or any two of them, who shall be attending the Congress of the United States, be, and they are hereby, directed, authorized, and fully empowered, in the name and behalf of this State, to make, execute, and deliver, under their hands and seals, an ample deed of release and cession of all the right, title, interest, jurisdiction, and claim of the State of Connecticut to certain western lands, beginning at the completion of the forty-first degree of north latitude, one hundred and twenty miles west of the western boundary line of the Commonwealth of Pennsylvania, as now claimed by said Commonwealth, and from thence by a line drawn north, parallel to and one hundred and twenty miles west of the said west line of Pennsylvania, and to continue north until it comes to forty-two degrees and two minutes north latitude. Whereby all the right, title, interest, jurisdiction, and claim of the State of Connecticut to the lands lying west of said line to be drawn as aforementioned, one hundred and twenty miles west of the western boundary line of the Commonwealth of Pennsylvania, as now claimed by said Commonwealth, shall be included, released, and ceded to the United States in Congress assembled, for the common use and benefit of the said States, Connecticut inclusive.

The cession of South Carolina was described as follows:

* * * All the territory or tract of country included within the river Mississippi and a line beginning at that part of the said river which is intersected by the southern boundary line of the State of North Carolina, and continuing along the said boundary line until it intersects the ridge or chain of mountains which divides the eastern from the western waters, then to be continued along the top of said ridge of mountains until it intersects a line to be drawn due west from the head of the southern branch of Tugaloo River to the said mountains; from thence to run a due west course to the river Mississippi.

The State of North Carolina ceded—

The lands situated within the chartered limits of the State, west of a line beginning on the extreme height of Stone Mountain, at the place where the Virginia line intersects it; running thence along the extreme height of the said mountain to the place where the Watauga River breaks through it; thence a direct course to the top of the Yellow Mountain where Bright's road crosses the same; thence along the ridge of the said mountain, between the waters of Doe River and the waters of Rock Creek, to the place where the road crosses the Iron Mountain; from thence along the extreme height of the said mountain to where Nolechucky River runs through the same; thence to the top of the Bald Mountain; thence along the extreme height of the said mountain to the Painted Rock, on French Broad River; thence along the highest ridge of the said mountain to the place where it is called the Great Iron or Smoky Mountain; thence along the extreme height of the said mountain to the place where it is called the Unicoy or Unaka Mountain, between the Indian towns of Cowee and Old Chota; thence along the main ridge of the said mountain to the southern boundary of this State.

It will be noted that the above description of the eastern boundary of her ceded possessions agrees in general terms with the description of the western boundary of North Carolina, as given on page 102.

The articles of cession by Georgia describe the area ceded as follows:

The lands situated within the boundaries of the United States, south of the State of Tennessee and west of a line beginning on the west bank of the Chattahouchee River, where the same crosses the boundary line between the United States and Spain; thence running up the said river Chattahouchee and along the western bank thereof to the great bend thereof, next above the place where a certain creek or river, called Uchee (being the first considerable stream on the western side, above the Cussetas and Coweta towns), empties into the said Chattahouchee River; thence in a direct line to Nickajack, on the Tennessee River; thence crossing the last-mentioned river, and thence running up the said Tennessee River and along the western bank thereof to the southern boundary line of the State of Tennessee.

Of the area thus ceded to the General Government, the part lying north of the Ohio was afterwards erected into the "Territory Northwest of the River Ohio," and the balance, lying south of that river, was known as the "Territory South of the River Ohio."

TERRITORY NORTHWEST OF THE RIVER OHIO.

This territory was bounded on the west by the Mississippi and the international boundary, on the north by the boundary line between the United States and the British Possessions, on the east by the Pennsylvania and New York state lines, and on the south by Ohio River. It comprised an area of, approximately, 266,000 square miles. It was made up of claims of different States as follows:

1. Virginia uncontested claims, which consisted of all the territory west of Pennsylvania and north of the Ohio to the forty-first parallel of north latitude, besides her claim, by capture, as far as the northern limits of the land under the crown which had been subject to the jurisdiction of the provinces of Quebec and to Lakes Michigan and Huron.

2. The claim of Connecticut, which extended from the forty-first parallel northward to the parallel of 42° 2′, and from the west line of Pennsylvania to the Mississippi River.

3. The claim of Massachusetts, which extended from the north line of the Connecticut claim above noted to 43° 43′ 12″ north latitude, and from the eastern boundary of New York to the Mississippi.

4. The belt or zone lying north of the Massachusetts claim, extending thence to the Canada line and west to the Mississippi River, was claimed to have been obtained by the treaty of peace of Great Britain, September 3, 1783.

5. At the cession by the state of Virginia, both Massachusetts and New York claimed the Erie purchase of about 316 square miles, which was subsequently bought by Pennsylvania and added to that State.

From this territory were formed the following States: Ohio, Indiana, Illinois, Michigan, Wisconsin, that part of Minnesota east of the Mississippi River, and the northwest corner of Pennsylvania.

In 1787 a bill for its provisional division into not less than three nor more than five States was passed by Congress. In this bill the limits of the proposed States were defined, corresponding in their north and south lines to the boundaries of Ohio, Illinois, and Indiana, as at present constituted. The following gives the text of the clause defining these boundaries:

CONFEDERATE CONGRESS—AN ORDINANCE FOR THE GOVERNMENT OF THE TERRITORY OF THE UNITED STATES NORTHWEST OF THE RIVER OHIO.

* * * * * * *

ARTICLE 5. There shall be formed in the said territory not less than three nor more than five States; and the boundaries of the States, as soon as Virginia shall alter her act of cession and consent to the same, shall become fixed and established as follows, to wit: The western State, in said territory, shall be bounded by the Mississippi, the Ohio, and the Wabash River; a direct line drawn from the Wabash and Post Vincents, due north, to the territorial line between the United States and Canada; and by the said territorial line to the Lake of the Woods and Mississippi. The middle State shall be bounded by the said direct line, the Wabash from Post Vincents to the Ohio, by the Ohio, by a direct line drawn due north from the mouth of the Great Miami to the said territorial line, and by the said territorial line. The eastern State shall be bounded by the last-mentioned direct line, the Ohio, Pennsylvania, and the said territorial line: *Provided, however*, And it is further understood and declared, that the boundaries of these three States shall be subject so far to be altered, that, if Congress shall hereafter find it expedient, they shall have authority to form one or two States in that part of the said territory which lies north of an east and west line drawn through the southerly bend or extreme of Lake Michigan.

Passed July 13, 1787.

The provisions of this bill seem, however, never to have been carried out. A provisional government was instituted in 1788. By act of May 7, 1800, Congress divided this territory into two territorial governments, the divisional line being a meridian passing through the mouth of the Kentucky River and extending thence northward to the Canada border. The eastern portion became the "Territory Northwest of the River Ohio," and the western portion, Indiana Territory.

On November 29, 1802, the State of Ohio, comprising most of the former, was formed and admitted into the Union, while the remnant of it was added to Indiana Territory.

In 1805, all that portion of Indiana Territory lying north of a parallel through the most southerly bend of Lake Michigan and east of a meridian drawn through the same point became the Territory of Michigan. The boundary between these territories was subsequently very much changed, as will appear in the sequel.

By act of February 3, 1809, Indiana Territory was again divided, and the Territory of Illinois was created from the part lying west of the Wabash River and a meridian running through the city of Vincennes, extending thence to the Canada line.

In 1816 Indiana, and in 1818 Illinois, were admitted to the Union as States, each with its boundaries as constituted at present. By the same act the Mississippi River was made the western boundary of the Territory of Michigan, thus making it include all the balance of the original Northwest Territory after the formation of the three States of Ohio, Indiana, and Illinois.

The act of 1834 added to Michigan Territory the land between the Missouri and White Earth Rivers on the west and the Mississippi River on the east.

Wisconsin Territory was formed in 1836 from the portion of Michigan Territory west of the present State of Michigan. On January 26, 1837, Michigan was admitted into the Union, with its present boundaries. In 1838 all that portion of Wisconsin Territory lying west of the Mississippi River and a line drawn due north from its source to the international boundary (that is, all that part which was originally comprised in the Louisiana purchase) was made the Territory of Iowa, and in 1848 Wisconsin was admitted as a State, with its boundaries as at present constituted.

This appears to leave the area which is now the northeastern part of Minnesota, lying east of the Mississippi River and a line drawn due north from its source, without any government until the formation of Minnesota Territory, in 1849.

TERRITORY SOUTH OF THE RIVER OHIO.

The "Territory South of the River Ohio" was bounded on the north by the present northern boundary of Tennessee, on the south by the thirty-first parallel of latitude, on the east by the States of Virginia, North Carolina, South Carolina, and Georgia, and on the west by Mississippi River. The different cessions from the States which made up this region are as follows:

1. The area ceded by North Carolina, which extended from 36° 30′ north latitude southward to 35°, and from the western boundary line of

the present State to the Mississippi River. This is now the State of Tennessee.

2. The area ceded by South Carolina, which formed a narrow belt, 12 or 14 miles in width, lying south of the thirty-fifth parallel, and extending from her western boundary to the Mississippi River. It is doubtful whether under the terms of the original charters South Carolina possessed this strip, or whether it was not included in the possessions of Georgia.

3. The area ceded by Georgia, which comprised most of the region of the present States of Alabama and Mississippi, north of the thirty-first parallel.

Tennessee was admitted as a State in 1796. In 1798 Congress organized the Territory of Mississippi, which was originally a small, rectangular area, bounded on the west by the Mississippi River, on the north by a parallel through the mouth of the Yazoo River; the boundary on the east was the river Chattahoochee, and on the south the thirty-first parallel of north latitude. This area was subsequently enlarged so as to include the whole of what is now Mississippi and Alabama, with the exception of a strip along the Gulf coast, which was at that time claimed by Spain. In 1817 the Territory was divided, and the eastern portion was made into Alabama Territory. Subsequently the two Territories were admitted as States.

LOUISIANA AND THE TERRITORY ACQUIRED FROM MEXICO.

The Louisiana purchase was effected in 1803. In 1804 it was divided into two parts, that portion which now comprises the State of Louisiana being organized as Orleans Territory, while the balance remained as the Louisiana Territory. The State of Louisiana, comprising most of the Territory of Orleans, was admitted to the Union in 1812, and in the same year it was enlarged by the addition of the portion lying between the Mississippi and Pearl rivers, in the southeastern part. In the same year the name of Louisiana Territory was changed to Missouri Territory. In 1819 Arkansaw Territory was created, and in 1836 it was admitted as a State.

In 1820 the State of Missouri was formed from another portion of Missouri Territory, and in 1836 the boundaries of this State were enlarged to their present limits. In 1834, as was stated above, that portion of this Territory lying north of the State of Missouri and east of the Missouri and White Earth rivers was attached to the Territory of Michigan. In 1836 this portion was transferred from the Territory of Michigan to the Territory of Wisconsin. In 1838 it was transferred to the Territory of Iowa. In 1845 the State of Iowa was created, and in 1846 its boundaries were enlarged. In 1849 the remainder of the Territory was transferred to Minnesota Territory. Minnesota was admitted as a State on May 11, 1858, with its present boundaries.

Meantime Texas had been admitted to the Union, and by the treaty of Guadalupe-Hidalgo and the Gadsden purchase, we had acquired from Mexico all the area west of the northern part of Texas and south of the forty-second parallel. Furthermore, our northern boundary had been established on the forty-ninth parallel to the Pacific Ocean.

Out of this great western region were carved the following Territories:

Oregon Territory, which was formed in 1848, and which extended from the parallel of 49° north latitude southward to latitude 42°, and from the Pacific Ocean east to the summit of the Rocky Mountains.

California, which was admitted as a State in 1849, with the same limits which it possesses at present.

Utah Territory, which was formed in 1850, and which extended from the forty-second parallel southward to the thirty-seventh, and from the California boundary line eastward to the Rocky Mountains.

New Mexico, which comprised all the country lying south of Utah to the boundary line of Texas and Mexico, and from the California boundary eastward to the boundary of Texas.

Nebraska Territory, which was formed from Missouri Territory in 1854. It comprised the country from the forty-ninth parallel down to the fortieth and from the Missouri and White Earth Rivers west to the summit of the Rocky Mountains.

Kansas Territory, formed by the same act as the last, comprised the country lying west of Missouri to the boundary of New Mexico and Utah, and from the south boundary of Nebraska to the thirty-seventh parallel.

Indian Territory then had its present limits.

Washington Territory was formed in 1853 from a part of Oregon, its southern boundary being Columbia River and the parallel of 46° north latitude, and its east line being the summit of the Rocky Mountains.

Oregon was admitted as a State in 1857, with its boundaries as at present established. The portion cut off from Oregon Territory was placed under the territorial government of Washington.

Dakota Territory was formed in 1861. As originally formed it comprised all that region between its present eastern and southern boundaries, while its western boundary was the summit of the Rocky Mountains.

The Territory of Nevada was organized from the western portion of the Territory of Utah in 1861. As originally constituted, its eastern line was the meridian of thirty-nine degrees of longitude west from Washington, and its southern boundary was the parallel of thirty-seven degrees of latitude. It was admitted as a State in 1864, its eastern boundary being made the thirty-eighth degree of longitude (approximately the one hundred and fifteenth degree west from Greenwich), while its southern boundary remained the same. In 1866, by act of Congress, the eastern boundary was moved one degree farther to the eastward, placing it upon the thirty-seventh degree of longitude west from Washington, and the triangular portion contained between the former southern boundary, the boundary of California, the Colorado River and the meridian of thirty-seven degrees of longitude was added, thus giving the State its present area and limits.

Colorado Territory was formed in 1861, with the limits of the present State. It was admitted as a State in 1876.

The Territory of Arizona was formed from New Mexico in 1863, being that portion of New Mexico lying west of the thirty-second meridian west of Washington.

In the same year Idaho was formed from parts of Dakota and Washington Territories. As originally constituted it included all the territory lying east of the present eastern limits of Oregon and Washington Territory to the twenty-seventh degree of longitude west of Washington, the latter meridian being its eastern boundary. Its southern boundary was the northern boundary of Colorado and Utah—that is, the forty-first and forty-second parallels of latitude

From this Territory was detached, in 1864, the Territory of Montana, with its present limits, and in 1868 the Territory of Wyoming, these several changes reducing Idaho to its present dimensions.

CHAPTER III.

THE BOUNDARY LINES OF THE STATES AND TERRITORIES.

MAINE.

The first charter having any relation to the territory comprising the present State of Maine is that granted by Henry IV of France to Pierre du Gast, Sieur de Monts, in 1603, known as the charter of Acadia, which embraced the whole of North America between the fortieth and forty-sixth degrees of north latitude. Under this, several expeditions were made, and in 1606 it was decided to make a permanent settlement at Port Royal, now Annapolis, Nova Scotia, and no further attempts were made under this charter to plant colonies within the limits of the present State of Maine. (*Vide* Charters and Constitutions, p. 771.)

By the first charter of Virginia (*vide* Virginia, p. 94), granted by James I, in 1606, the lands along the coast of North America between the thirty-fourth and forty-fifth degrees of north latitude were given to two companies, to one of which, the Plymouth Company, was assigned that part of North America including the coast of New England. The first colony in Maine was planted on the peninsula of Sabine, at the mouth of Kennebec River, now Hunnewell Point, on August 19, 1607, O. S., by George Popham.

James I in 1620 granted a charter to the Plymouth Company, in which may be found the following, viz:

> Wee, therefore * * * do grant ordain and establish that all that Circuit, Continent, Precincts and Limitts in America lying and being in Breadth from Fourty Degrees of Northerly Latitude from the Equnoctial Line, to Fourty eight Degrees of the said Northerly Latitude and in length by all the Breadth aforesaid throughout the Maine Land from Sea to Sea—with all the Seas, Rivers, Islands, Creekes, Inletts, Ports and Havens within the Degrees, Precincts and Limitts of the said Latitude and Longitude shall be the Limitts, and Bounds, and Precincts of the second collony—and to the end that the said Territoryes may hereafter be more particularly and certainly known and distinguished, our Will and Pleasure is, that the same shall from henceforth be nominated, termed and called by the name of New England in America.

Under this grant, given in 1621, the Earl of Stirling claimed that he was entitled to land on the coast of Maine which was afterwards granted to the Plymouth Company, and by direction of James I that company issued a patent to William Alexander, Earl of Stirling,

> For a tract of the main land of New England, beginning at Saint Croix and from thence extending along the sea-coast to Pemquid and the river Kennebeck. (*Vide* Charters and Constitutions, p. 774.)

The heirs of the Earl of Stirling sold this tract to the Duke of York in 1663. (*Vide* Zell's Encyclopædia.)

In 1622 Capt. John Mason and Sir Ferdinando Gorges obtained from the council of Plymouth a grant of the lands lying between the Merrimac and Kennebec Rivers, and extending back to the river and lakes of Canada. This tract was called Laconia, and it included New Hampshire and all the western part of Maine. (*Vide* Whiton's New Hampshire.)

Mason and Gorges, in 1629, by mutual consent divided their territory into two by the river Piscataqua. That part on the east of this river was relinquished to Gorges, who called it Maine. (*Vide* Whiton's New Hampshire.)

The charter of the Plymouth Company was surrendered to the King in the year 1635. (*Vide* Plymouth Colony Laws, p. 333 *et supra.*)

King Charles I, in the year 1639, granted a charter to Sir Ferdinando Gorges, which virtually confirmed the patent given to him by the Plymouth Company in 1622.

The following extract from that charter defines the boundaries:

> All that Parte Purparte and Porcon of the Mayne Lande of New England aforesaid beginning att the entrance of Piscataway Harbor and soe to passe upp the same into the River of Newichewanocke and through the same unto the furthest heade thereof and from thence Northwestwards till one hundred and twenty miles bee finished and from

Piscataway Harbor mouth aforesaid Northeastwards along the Sea Coasts to Sagadahocke and up the River thereof to Kynybequy River and through the same into the heade thereof and into the Lande Northwestwards untill one hundred and twenty myles bee ended being accompted from the mouth of Sagadahocke and from the period of one hundred and twenty myles aforesaid to crosse over Lande to the one hundred and twenty myles end formerly reckoned upp into the Lande from Piscataway Harbor through Newichewanocke River and also the Northe halfe of the Isles of Shoales togeather with the Isles of Capawock and Nawtican neere Cape Cod as alsoe all the Islands and Iletts lyeinge within five leagues of the Mayne all alonge the aforesaide coasts betweene the aforesaid River of Pascataway and Sagadahocke with all the Creeks Havens and Harbors thereunto belonginge and the Reversion and Reversions Remaynder and Remaynders of all and singular the said Landes Rivers and Premisses. All which said Part Purpart or Porcon of the Mayne Lande and all and every the Premisses herein before named Wee Doe for us our heires and successors create and incorporate into One Province or Countie, and Wee Doe name ordeyne and appoynt that the porcon of the Mayne Lande and Premises aforesaid shall forever hereafter bee called and named The Province or Countie of Mayne.

In 1664 Charles II granted to the Duke of York, who, the year before, had purchased the territory, which had been awarded to the Earl of Stirling in the division of the country to his heirs, a portion of the present State of Maine, and also certain islands on the coast, and a large territory west of the Connecticut River. (For the boundaries *vide* New York, p. 76 *et seq.*)

In 1674 Charles II made a new grant to the Duke of York, in substantially the same terms as that of 1664, including as before a portion of Maine. (*Vide* New York, p. 77.)

In the year 1677, Ferdinando Gorges, a grandson of Sir Ferdinando Gorges sold and gave a deed of the province of Maine to John Ushur, a merchant, of Boston, for £1,250. In the same year, Ushur gave a deed of the same territory to the governor and company of Massachusetts Bay, who had received a grant from the council of Plymouth in 1628, confirmed by the King in 1629. (*Vide* C. & C., p. 774.)

In 1686 Pemaquid and its dependencies, forming Cornwall County, under the jurisdiction of New York, were annexed to the New England government by a royal order, dated September 19, 1686. (*Vide* Maine Historical Society Collection, vol. 5.)

The charter of Massachusetts Bay of 1629 having been canceled in 1684, in 1691 William and Mary granted a new one, incorporating the provinces of Maine and Acadia, or Nova Scotia, with the colonies of Massachusetts Bay and of Plymouth, into one royal province by the name of the Royal Province of Massachusetts Bay. (*Vide* Mass., p. 54.)

The right of government thus acquired over the district of Maine was exercised by Massachusetts until 1819 when measures were taken to admit Maine as an independent State.

By the treaty of Paris in 1763 the King of France relinquished all claim to that portion of North America which includes the present State of Maine.

The northern and eastern boundaries were settled by the United States and Great Britain. (See p.13, *et seq*).

The western boundary was for a long time a source of contention between Maine and New Hampshire.

New Hampshire having been made a province in 1679, controversies arose concerning the divisional line.

In 1731 commissioners from New Hampshire and from Massachusetts having been appointed, met, but were unable to agree. New Hampshire appealed to the King, and the King ordered that a settlement should be made by commissioners from the neighboring provinces. The board met at Hampton in 1737. The commissioners fixed on—substantially—the present boundary, wording their report as follows:

> Beginning at the entrance of Pascataqua Harbor, and so to pass up the same to the River Newhichawack, and thro' the same into the furthest head thereof, and thence run north 2 degrees west till 120 miles were finished, from the mouth of Pascataqua Harbor, or until it meet with His Majesty's other Governments. (See N. H. Historical Coll., Vol. II.)

This was confirmed by the King, August 5, 1740.

In 1820 Maine was admitted, as an independent State.

Difficulties having arisen about the boundary between Maine and New Hampshire, commissioners were appointed in 1827 from each State to determine the same.

In 1829 the commissioners' report was adopted by each State, and the line then settled upon is as follows, using the language of the commissioners' report, viz:

> The report of the commissioners appointed by His Majesty's order in Council of February 22nd, 1735, and confirmed by his order of the 5th of August, 1740, having established—
>
> "That the dividing line shall pass up through the mouth of Piscataqua Harbor, and up the middle of the river of Newichwannock, part of which is now called the Salmons Falls, and through the middle of the same to the farthest head thereof, &c.," and "that the dividing line shall part the Isle of *Sholes*, and run through the middle of the harbor, between the islands to the sea on the southerly side, &c." We have not deemed it necessary to commence our survey until we arrived north, at the head of Salmon Falls River, which was determined by Bryant, at his survey in 1740, to be at the outlet of East pond, between the towns of Wakefield and Shapleigh. From that point we have surveyed and marked the line as follows, viz:
>
> We commenced at the Bryant Rock, known as such by tradition, which is a rock in the middle of Salmon Falls River, at the outlet of East pond, about six feet in length, three feet in breadth, three feet in depth, and two feet under the surface of the water, as the dam was at the time of the survey, to wit, October 1, 1827; said stone bears south, seventy-one degrees west, three rods and eight links from a large rock on the eastern bank, marked "1827," and bears also from a rock near the mill-dam (marked "H") north, nineteen degrees and thirty minutes west, and distant twelve rods and twenty-one links. At this point the variation of the needle was ascertained to be *nine degrees* west.
>
> From the above stone the line is north seven degrees and forty-one minutes east, one hundred and seventy-eight rods to East pond, and crossing the pond three hundred and eleven rods in width to a stone monument which we erected up on the bank, about three and an half feet high above the surface of the ground, marked N on the

west side and M on the east side, which description applies to all the stone monuments hereinafter mentioned unless they are otherwise particularly described; thence the same course, two hundred and twenty-five rods, to Fox Ridge, and to a stone monument which is placed upon the north side of the road that leads from Wakefield to Shapleigh; thence two hundred rods to Balch's pond; across the pond, one hundred and three and half rods; across a peninsula, thirty-six rods; across a cove, fifty-one rods and seventeen links; across a second peninsula, forty-eight rods; across a second cove, twenty-seven rods, ten links.

Thence three hundred and seventy rods, to the road leading from Newfield to Wakefield and a stone monument, erected on the north side of the same, near Campernell's house; thence north six degrees and ten minutes east, five hundred and ninety rods, to the line of Parsonfield, to a stone monument with additional mark "1828."

At this point the variation of the needle was found to be nine degrees fifteen minutes west. Thence same course five hundred and eleven rods, crossing the end of Province pond to a stone monument on the Parsonfield road, near the house of James Andrews, also with additional mark "1828"; thence north eight degrees and thirty-eight minutes east, two hundred and eight rods, to the old corner-stone of Effingham, about two feet above the ground, and not marked; thence north eight degrees fifty-five minutes east, two hundred and seventy-seven rods, to a large round stone about three feet diameter and two feet high, marked N and M, by the road upon Towles hill; thence north seven degrees fifty-five minutes east, six hundred and thirty-one rods to a stone monument, on the road leading from Parsonfield to Effingham. At this point the variation of the needle was found to be 9 degrees thirty minutes west. Thence north five degrees two minutes east, seven hundred thirty-four to a pine stump, upon a small island in Ossipee River at the foot of the falls; thence north ten degrees east, thirty rods, to a stone monument, on the north side of the new road from Porter to Effingham; thence the same course, five hundred fifty-eight rods, to the top of Bald Mountain; thence same course, three hundred sixteen rods, to the top of Bickford Mountain; thence same course one hundred and ninety-three rods, to a stone monument, on the north side of the road, leading from Porter to Eaton.

At this point the variation of the needle was found to be nine degrees forty-five minutes west; thence north eight degrees five minutes east, seven hundred and forty-four rods, to Cragged Mountain; thence same course, sixty-seven rods, to the corner of Eaton; thence same course, seven hundred eighty-seven and an half rods, to the corner of Conway; thence same course, six hundred ten and an half rods, to a stone monument, on the south side of the road, leading from Brownfield to Conway Center; thence north eight degrees east, eight hundred seventy-one rods, to a stone monument on the south side of the road leading from Fryeburg Village to Conway. At this point the variation of the needle was found to be ten degrees west; thence same course, four rods, to a stone monument on the north side of the same road; thence north eight degrees fifteen minutes east, one hundred two rods, to Saco River; thence same course, eighteen rods, across said river; thence same course, six hundred forty-four rods, to a stone monument on the road leading to Fryeburg Village, on the north side of the river.

This monument is marked as before described, and is about eight feet high above the ground; thence same course, one hundred forty-two rods, to Ballard's Mill Pond; thence same course, sixty-one rods, six links, across said pond; thence same course, three hundred forty-four rods, to a stone monument on the east side of Chatham road; thence same course, six hundred ninety rods, to Kimball's Pond; thence same course, one hundred sixty-six rods, across said pond; thence same course, sixty rods, to a stone monument on the meadow.[1] Thence same course, nine hundred forty rods, to the corner of Bradley and Eastman's grant; thence same course, six hundred and ninety rods, to a stone monument on the east side of the Cold River road. This stone is marked as before described, but is not more than two feet above the ground. Thence same course, one thousand five hundred forty rods, to the corner of Warner and Gilman's location, a pile of stones. At this point the variation of the needle was found to be ten degrees twenty-three minutes west; thence same course, four hundred and fifty rods, to top of Mount Royce; thence same course, eight hundred ninety-eight rods, to Wild River; thence same course, eight rods, across said river; thence same course, seven hundred sixty-five rods, to a stone monument on the north side of the road leading from Lancaster to Bethel; thence same course, one hundred rods, to Androscoggin River; thence same course, eighteen rods, across said river; thence north eight degrees ten minutes east, four thousand one hundred sixty-two rods, across ten streams, to Chickwalnepg River; thence same course, two thousand five hundred rods, to a stone monument on the north side of the road leading from Errol to Andover. This stone is marked "N. H." and "M.," thence same course two hundred ten rods to Cambridge River, thence same course eight rods across said river, thence same course five hundred sixty-seven rods to Umbagog Lake, thence same course thirty-four rods across a cove of the same, thence same course ten rods across a peninsula of the same, thence same course two hundred twenty-five rods across a bay of said lake, thence same course two hundred six rods across a peninsula of the same, thence same course one thousand one hundred sixty-five rods across the north bay of said lake to a cedar post marked "N." "M.," thence north eight degrees east seven hundred fourteen rods to Pond brook; thence same course two hundred twenty-five rods to a stone monument on the south side of the Margallaway River, thence same course ten rods across said river, thence same course one hundred sixty-two rods to a spruce, corner of the college grant, thence same course two hundred sixty-four rods to Margallaway River a second time. At this point the variation of the needle was found to be eleven degrees forty-five minutes west; thence same course ten rods across said river, thence same course two hundred and ninety rods to same river a third time, thence same course ten rods across said river to a monument made with three stones on the north side of said river, about two feet high and not marked, thence same course four hundred forty-four rods to corner of township number five, in second range, in Maine, thence same course one thousand eight hundred six rods to the north corner of the same township, thence same course four hundred and sixty rods to a branch of Little Diamond River, thence same course three hundred fifty rods to another branch of the same, thence same course two thousand one hundred twenty rods to a branch of the Margallaway River, thence same course three hundred thirty-two rods to another branch of the same, thence same course four hundred rods to a steep mountain called Prospect Hill, thence same course nine hundred and twenty rods to Mount Carmel, sometimes called Sunday Mountain, thence same course four hundred rods to a perpendicular precipice, thence same course five hundred and forty rods to a branch of Margalloway River, thence same course two hundred and sixty rods to a branch of the same, thence same course three hundred forty-six rods to a second steep precipice, thence same course one hundred eighty-six rods to a branch of Margallaway River, thence same course two hundred forty-two rods to another branch of same river, thence same course seventy-eight rods to a beaver pond, thence same course one hundred twenty-six rods to a yellow birch tree on the highlands which divide the waters that run south from those that run into the St. Lawrence, being the northern extremity of the line and one hundred and twelve miles two hundred and thirty-three rods from the head of Salmon Falls River.

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[1] From this point the line was resurveyed in 1858, *vide* p. 44.

Found said tree marked on the east side "M. E. 1789," and on the west "N. H. N. E.;" also "M. 54." To these marks we added "N. H.," "N. E.," and "M. E.," "1828," "E. H.," "A. M. M.," "1828," and stones were piled round the same and marked.

The whole course of the line from the Androscoggin River was re-marked by spotting the old marked trees and crossing the spots and marking others in the course. And the line as above survey and described we agree to be the true boundary line of said States. And the above-described marks and monuments we establish to designate the same, and that the said line hereafter remain the boundary line between the States, unless the legislature of either State shall, at the first session after the execution of this agreement, disapprove of the same.

WILLIAM KING,
RUFUS McINTIRE,
Commissioners of Maine.
ICHABOD BARTLETT,
JOHN W. WEEKS,
Commissioners of New Hampshire.

NOVEMBER 13, 1828.

The legislature of Maine approved of the commissioners' report February 28, 1829, and requested the governor to issue his proclamation accordingly.

The same action was taken by the legislature of New Hampshire, July 1, 1829.

(For Report of Commissioners, see Laws of Maine, 1828–'9, under head of Resolves of the Ninth Legislature of the State of Maine, pages 39–43.)

Between 1828 and 1858, considerable portions of the amost unbroken forests through which the line of 1827–'28 was marked were cleared. Extensive forest fires often swept large tracts of this territory, and, as a consequence, the marks of the 1827–'28 survey for a distance of nearly eighty miles—which by that survey was mainly fixed by blazed trees, —only *seven* stone posts having been set in this distance—were obliterated, so that there remained scarcely a vestige of the original line. The lands having become valuable, and litigation in many cases being imminent, the legislatures of the two States in 1858 provided by enactment for another survey from Fryeburg to the Canada line—which was made the same year. The line as then surveyed is as follows, viz:

Commencing at an iron post[a] situated on the line run in accordance with the "Treaty of Washington, of August 9, 1842," as the boundary between the United States and the province of Canada, at the corners of the States of Maine and New Hampshire. On the south face of said post are the words "Albert Smith, U. S. Comssr."; on the north face, "Lt. Col. I. B. B. Eastcourt, H. B. M. Comssr."; on the west face, "Boundary, Aug. 9, 1842"; on the east face, "Treaty of Washington." To the marks are added on the southern half of the west face, "H. O. Kent." A large flat stone was placed on the southern face of the monument and marked "1858—N. H., Me.," on either side of a line cut in said stone bearing the direction of the State's line, viz, south, 8 degrees west.

From this point the line is south 8 degrees west, 17 rods, 7 links to a large yellow birch stub, the northern terminus of the former survey; thence 126 rods to a beaver pond; thence 78 rods to the northwesterly branch of the Margallaway, known as Kent River; thence 242 rods to another branch of the Margallaway; thence 186 rods to a certain steep precipice perpendicular on its southern face; thence 346 rods to a branch of the Margallaway River; thence 260 rods to another branch of the same; thence 540 rods to a precipice, the southern side of Mount Abbott; thence 400 rods to the summit of Mount Carmel; thence 920 rods, and across four streams, to the summit of Prospect Hill.

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[a] The position of this post is given in Hitchcock's Geological Survey of New Hampshire, as follows, viz, latitude, 45° 18′ 23″.33; longitude, 71° 5′ 40″.5.

On this distance we marked a yellow birch tree "H. O. Kent, September 20, 1858," and the names of the remainder of the party; thence 400 rods to another branch of the Margallaway; thence 332 rods to the Little Margallaway River; thence 2,120 rods across Boisbuck Mountain to a branch of said river. On this distance at the northwest corner of township No. 5, range 3, in Maine, we marked a white birch tree, "N. H. M.," and on its north and south sides, "IV, III." Thirty rods from the summit of Boisbuck Mountain, and on its northern slope, we erected a stone monument marked "N. M."; thence 350 rods to the Little Diamond River or Abbott Brook; thence 460 rods to the northwest corner of township No. 5, range 2, in Maine. On this distance we found an ancient yellow birch tree marked "1789–35, M." To these marks we added "1858"; thence 1,806 rods to the southwest corner of the same township. On this distance, at the northeast corner of Dartmouth College, second grant in N. H., we marked a large yellow birch tree "Me., J. M. W., 1858; N. H., H. O. K."; thence, and across an open bog, 444 rods to the north bank of the Margallaway River, to a white maple tree marked "N. H. M."; thence 10 rods across said river to a large pine tree marked "M." "N. H."; thence and across a second open bog 290 rods to the same river and to a large elm stub; thence 10 rods across said river; thence 264 rods to a spruce post marked "M." "N. H.", "W. L.", "D. C.", being the southeast corner of Dartmouth College, second grant; thence 162 rods to the Margallaway River; thence 10 rods across said river to a stone monument on its southerly side, standing about 3 feet above the ground and marked "M." "N. H."; thence to the original line tree nearest to the clearing of the home farm of Z. F. Durkee, esq. *The course of the line the entire distance from the iron post at the national boundary to this point bears south eight degrees west;* thence across said clearing, the old line marks being gone, south 11 degrees and 30 minutes west, 168 rods, to the old crossed trees in the woods south of Pond Brook; thence from Pond Brook south eight degrees west, 714 rods to the north bog of Umbagog Lake and to a cedar tree marked "M." "N." To this we added "1858."

On this distance near the corner of Errol and Wentworth's location, which is a cedar post in a pile of stones, we marked a maple tree "M. 1858," "N. H. 1858"; thence south ten degrees and thirty minutes west 1,165 rods, across the north bay of said lake to the old marked trees on the southern shore; thence south eight degrees west 206 rods across the peninsula to a cedar tree marked "M." "N. H." A large stone, also, on the lake shore was marked "M," "N. H."; thence same course 225 rods, across a bay of said lake; thence same course 10 rods, across a peninsula; thence same course 34 rods across a cove; thence same course 567 rods to Cambridge River; thence same course 8 rods, across said river to a white maple stub; thence same course 210 rods to a stone monument on the north side of the road leading from Andover, Me., to Colebrook, N, H.; thence same course to the north edge of the burnt land in Grafton and Success; thence south 11 degrees west across ten streams and the Chickwalmpy River, or Silver Stream, to the old line trees bearing the crosses, easterly of the south end of Success Pond; thence on the same course south 10 degrees west following the old mark to an ash tree bearing the original cross, standing a few rods north of the house of the late Daniel Ingalls, in Shelburne; thence south 11 degrees west to a stone monument, by the road on the north side of the Androscoggin River, and to the north bank of said river, the whole distance from the stone monument near Umbagog Lake to the north bank of the Androscoggin River, being 6,662 rods; thence south 11 degrees west 18 rods across said river; thence same course 100 rods, crossing the track of the Grand Trunk Railway to a stone monument on the north side of the road leading from Lancaster, N. H., to Bethel, Me.; thence same course, 765 rods to a hemlock tree on the south bank of Wild River; thence south 66 degrees 30 minutes west 34 rods on an offset of the old survey along said south bank to the old line trees; thence following the old line trees south 11 degrees west, passing the southeast corner of Shelburne, 898 rods to the top of Mount Royce, the whole distance being 1,881 rods. One mile north of the summit of Mount Royce we marked a beech tree "N. H." "M.," 1858; thence to a large stone marked "N. H." "Me."; thence south 10 degrees 15 minutes west to a stone monument on the east side of the Cold River road. On this distance at the foot of the first precipice on the northern face of Mount Royce a white-birch tree was marked "1858." Further on and east of a bare ledge a white-birch tree was marked "1858," and near it, on the line, a pile of stones was erected. At the first clearing, near the north end of a stone fence, a large stone was marked "M." "N. H."; thence along a stone fence and across a road through a piece of new growth and again crossing the road; then following another stone fence on the east side of the road, passing through a field and by the end of another stone fence; then crossing a road near the west end of a bridge over Cold River; then following the valley of that stream and crossing it six times; then crossing another road, where we placed a stone monument; then through a field, striking an old stump and pile of stones, shown as the old line and passing between a house and barn, and through the western edge of a grove of trees to the stone monument near the house of Mr. Eastman, the whole distance being 1,190 rods; thence 1,630 rods to a stone monument standing in the meadow 60 rods north of the north shore of Kimball's pond, in Fryeburg.

But as the towns of Fryeburg and Stowe have erected no durable monument on the State's line at their respective corners, we deemed it advisable, under our instructions, to proceed so far south as at least to pass the said corner and to complete the work at some well-defined monument of the old survey.

This course bore from the monument to and across an open bay south 12 degrees west; thence on the old trees south 9 degrees west 100 rods; thence on the old line south 10 degrees 30 minutes west to a stone monument erected by us near the house of Jonnet Clay, in Chatham, and on the north side of the road leading from Stowe to Chatham Corners; said monument is marked "M." "N. H." 1858; thence on the old line south 11 degrees west to the road leading from North Fryeburg to Chatham, at which point we placed a stone monument; thence south 11 degrees west to the northwest corner of Fryeburg, being a stake in a pile of stones in a piece of low ground, southerly of the house of Captain Bryant, and to the old monument, 60 rods north of Kimball's pond. On the bank north of said corner, on the south side of the road, and near Captain Bryant's house, we placed a stone monument marked "M." "N. H. 1858."

The different courses laid down in the foregoing report are the bearings of the compass in 1858 when placed on the line established in 1828. (See Legislative Journal of New Hampshire, 1859, pages 764–767.)

In 1874 the line between Maine and New Hampshire was resurveyed and marked. (*Vide* Hitchcock's Geology of New Hampshire, Vol. I, p. 173.)

NEW HAMPSHIRE.

The first charter of Virginia, granted in 1606, included the territory of the present State of New Hampshire (*vide* p. 38), as did the charter of New England, granted in 1620 (*vide* p. 39), and the grant to Capt. John Mason and Sir Ferdinando Gorges of 1622 (*vide* p. 39).

The president and council of New England made a grant to Capt. John Mason in 1629 as follows, viz:

* * * * * * *

All that part of the main land in New England lying upon the sea coast, beginning from the middle part of Merrimack River, and from thence to proceed northwards along the sea-coast to Piscataqua River, and so forwards up within the said river and to the furthest head thereof, and from thence northwestwards until three score miles be finished from the first entrance of Piscataqua River and also from Merrimack through the said river and to the furthest head thereof, and so forward up into the lands westward until three score miles be finished, and from thence to cross overland to the three score miles, and accompted to Piscataqua River, together with all islands and islets within 5 leagues distance of the premises and abutting upon the same, or any part or parcel thereof, &c., * * * which said portions of lands * * * the said Capt. John Mason, with the consent of the president and council, intends to name *New Hampshire.* * * *

In 1635 the grant of 1629 was confirmed by a supplementary grant, of which the following is an extract, viz:

All that part of the Mayn Land of New England aforesaid, beginning from the middle part of Naumkeck River, and from thence to proceed eastwards along the Sea Coast to Cape Anne, and round about the same to Pischataway Harbour, and soe forwards up within the river Newgewanacke, and to the furthest head of the said River and from thence northwestwards till sixty miles bee finished, from the first entrance of Pischataway Harbor, and alsoe from Naumkecke through the River thereof up into the land west sixty miles, from which period to cross over land to the sixty miles end, accompted from Pischataway, through Newgewanacke River to the land northwest aforesaid; and alsoe all that the South Halfe of the Ysles of Sholes, all which lands, with the Consent of the Counsell, shall from henceforth be called New-hampshyre. And alsoe ten thousand acres more of land on the southeast part of Sagadihoc at the mouth or entrance thereof—from henceforth to bee called by the name of Massonia, &c. * * *

After the death of Capt. John Mason (in December, 1635), the affairs of the colony coming into bad condition, they sought the protection of Massachusetts in 1641 and enjoyed it till 1675, when Robert Mason, a grandson of John Mason, obtained a royal decree, under which, in 1680, a colonial government was established. But no charter was given to the colony, and its government was only continued during the pleasure of the King. The following is an extract from the commission, or decree, issued by the King in 1680:

Province of New Hampshire, lying and extending from three miles northward of Merrimack River or any part thereof into ye Province of Maine.

In the year 1690 the province of New Hampshire was again taken under the jurisdiction of Massachusetts Bay, but was again separated in 1692.

[For a history of the boundary between New Hampshire and Maine, *vide* Maine, p. 41.]

The controversy already referred to arising between the provinces of New Hampshire and Massachusetts Bay not only involved the settlement of the boundary between New Hampshire and Maine, but also that between New Hampshire and Massachusetts, and, as before stated (*vide* Maine, p. 41), the commissioners appointed by the two provinces having been unable to agree, New Hampshire appealed to the King, who ordered that the boundaries should be settled by a board of commissioners appointed from the neighboring colonies.

The board met at Hampton in 1737, and submitted a conditional decision to the King, who in 1740 declared in council as follows, viz:

> That the northern boundary of the province of Massachusetts be a similar curve line pursuing the course of the Merrimac River, at three miles distance, on the north side thereof, beginning at the Atlantic Ocean and ending at a point due north of Pautucket Falls, and a straight line drawn from thence, due west, till it meets with His Majesty's other Governments. (*Vide* Vermont State Papers, Slade, p. 9.)

New Hampshire claimed her southern boundary to be a line due west from a point on the sea three miles north of the mouth of Merrimac River. Massachusetts claimed all the territory three miles north of any part of Merrimac River. The King's decision gave to New Hampshire, a strip of territory more than fifty miles in length and of varying width, in excess of that which she claimed. This decree of the King was forwarded to Mr. Belcher, then governor of both the provinces of New Hampshire and Massachusetts Bay, with instructions to apply to the respective assemblies to unite in making the necessary provisions for running and marking the line conformable to the said decree, and if either assembly refused, the other was to proceed *ex parte*. Massachusetts Bay declined complying with this requisition. New Hampshire, therefore, proceeded alone to run and mark the line.

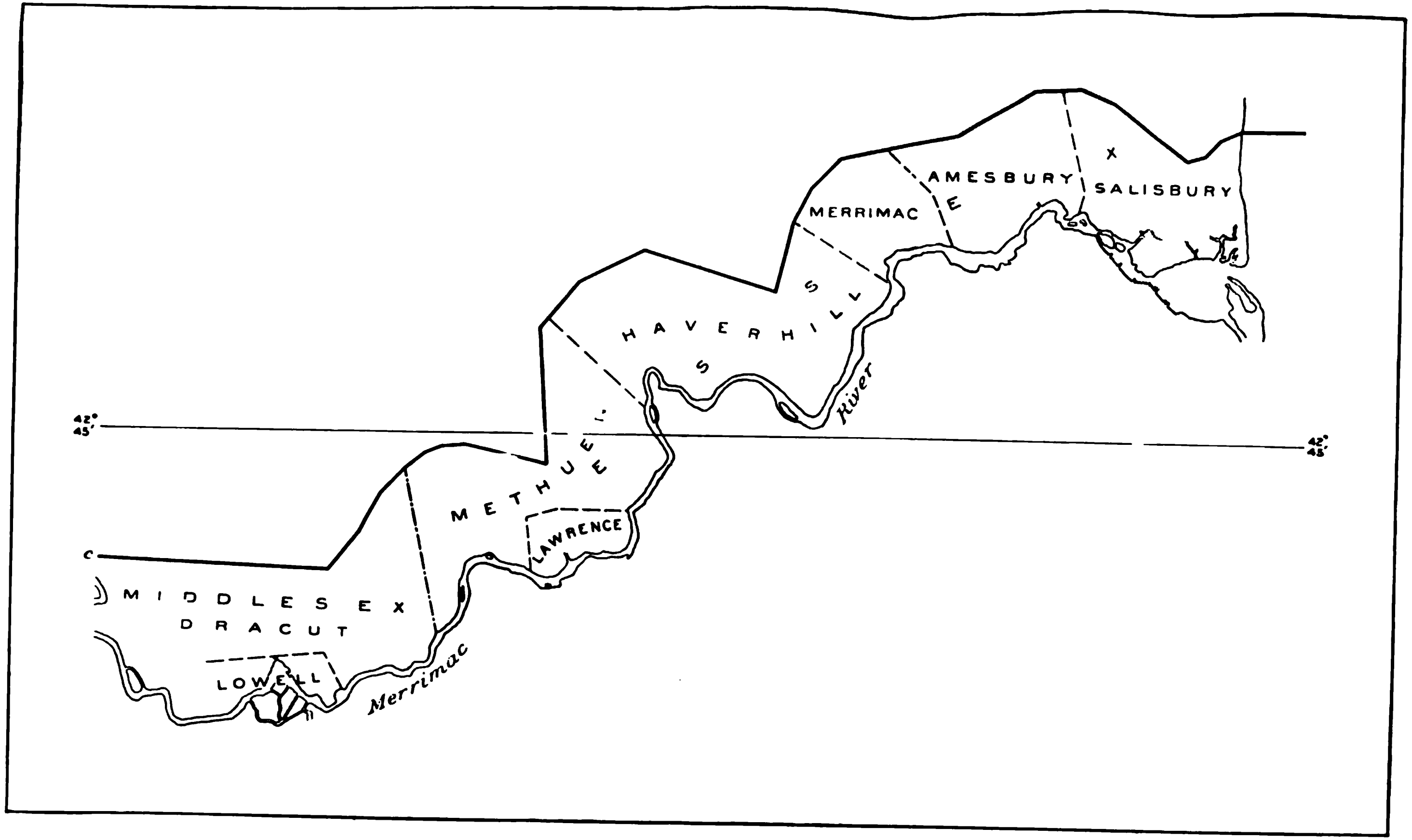
George Mitchel and Richard Hazen were appointed by Belcher to survey and mark the line. Pursuant to this authority, in the month of February, 1741, Mitchel ran and marked the line from the sea-coast about three miles north of the mouth of the Merrimac River to a point about three miles north of Pawtucket Falls, and Hazen, in the month of March following, ran and marked a line from the point, three miles north of Pawtucket Falls, across the Connecticut River, to the supposed boundary line of New York, on what he then supposed to be a due west course from the place of beginning. He was instructed by Governor Belcher to allow for a westerly variation of the needle of ten degrees. (*Vide* New Hampshire Journal H. R., 1826.)

The report of the surveyors has not been preserved, but the journal of Hazen has been found, and is published in the New England Historical and Genealogical Register, July, 1879.

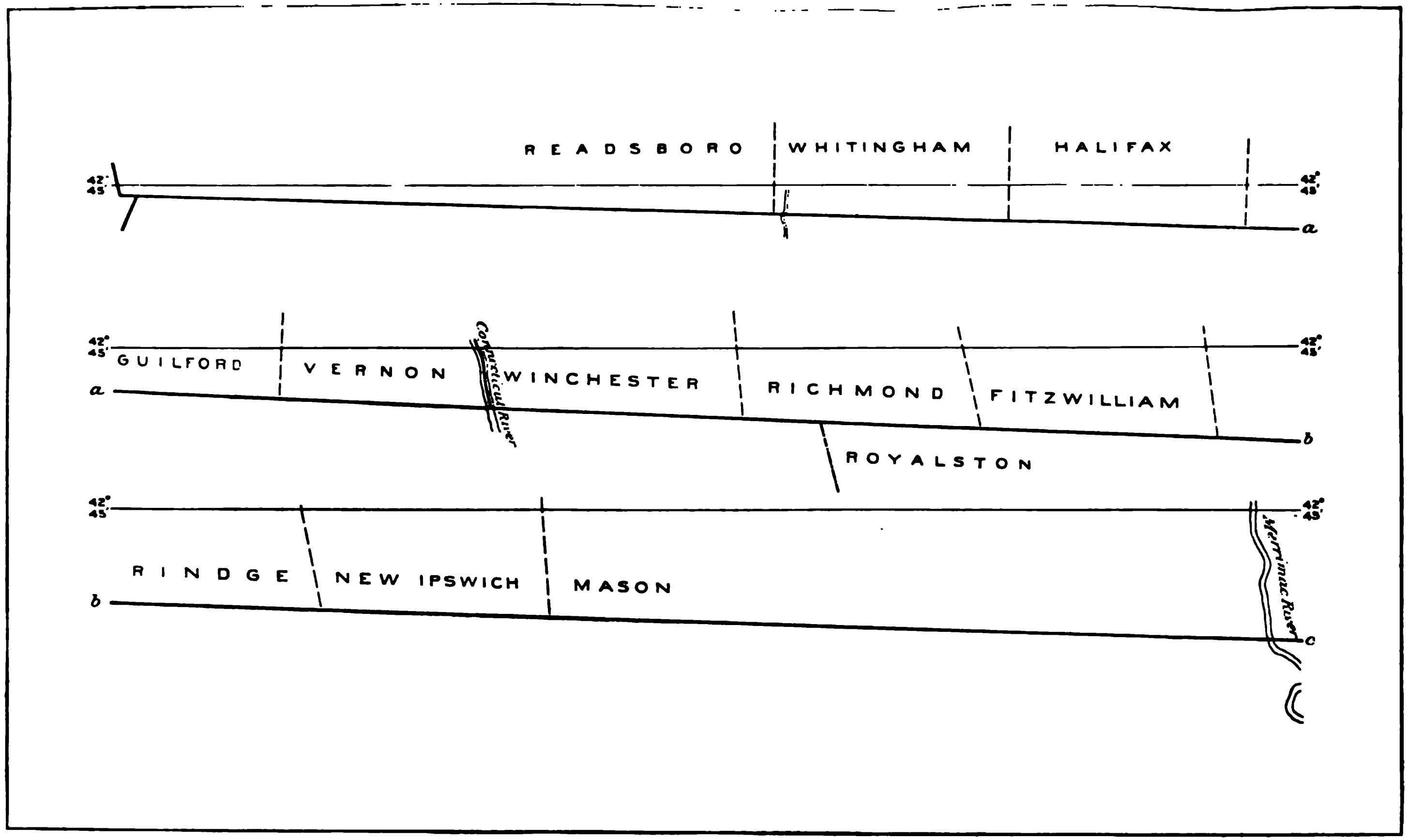
Subsequent investigation has proved that this line was not run on a due west course, the allowance for the westerly variation of the needle being quite too large, throwing the line north of west.

This mistake seems to have been known previous to the Revolution. In 1774 calculations were made by George Sproule, founded upon actual surveys and accurate astronomical observations, from which he determined that Hazen's line was so far north of west as to lose to the State of New Hampshire quite a large tract of land. (*Vide* New Hampshire Journal H. R., 1826.)

In 1825 commissioners were appointed by the States of New Hamp-



NORTH BOUNDARY OF MASSACHUSETTS.



NORTH BOUNDARY OF MASSACHUSETTS.

ire and Massachusetts to ascertain, run, and mark the line between e two States, under the proceedings of which New Hampshire asserted r claim to a due west line, conformable to the decree of 1740, it being parent by a survey made by the commissioners that the original line as north of west. This the Massachusetts commissioners refused to do, leging that they were only empowered to ascertain and mark the iginal line.

On March 10, 1827, the legislature passed a resolution providing for c erection of durable monuments to preserve the boundary line tween the States of Massachusetts and New Hampshire, as the same d been run and ascertained by the commissioners, and monuments ere erected accordingly. (*Vide* Resolves of Massachusetts, 1827.)

In 1885 the joint commission appointed by the States of New Hamp-ire and Massachusetts re-ran and marked the curved portion of the undary, following the course of Merrimac River, changing it only a trifling extent. This commission was, however, unable to agree pon the boundary west of Pawtucket Falls. This matter dragged long until finally in 1894 this commission, together with a commission presenting Vermont, agreed to maintain the Hazen line, and this line as re-traced and re-marked from Pawtucket Falls to the northwest rner of Massachusetts.

Under the decree of the King of 1740 the province of New Hampshire laimed jurisdiction as far west as the territory of Massachusetts and onnecticut extended, thus including the present State of Vermont. New York claimed all the country west of the Connecticut, under the charters of 1664 and 1674 to the Duke of York. A bitter controversy ensued. The following papers serve to throw some light on the matter:

Letter from the Governor of New Hampshire to the Governor of New York.

PORTSMOUTH, *November 17, 1749.*

* * * I think it my duty * * * to transmit to your excellency the description of New Hampshire as the King has determined it in the words of my commission. * * * In consequence of His Majesty's determination of the boundaries between New Hampshire and Massachusetts, a surveyor and proper chainmen were appointed to run the western line from 3 miles north of Pautucket Falls, and the surveyor upon oath has declared that it strikes Hudson's River about 80 poles north of where Mohawk's River comes into Hudson's River.

* * * * * *

B. WENTWORTH.

(See State Papers of Vermont, Slade, 1, page 10.)

The following is a description of the bounds of New Hampshire given to Governor Benning Wentworth, of province of New Hampshire, by George II, July 3, 1741:

George the Second, by the Grace of God, of Great Britain, France, and Ireland King, Defender of the Faith, &c.

To our trusty and well-beloved Benning Wentworth, esqr., greeting:

Know you that we, reposing especial trust and confidence in the prudence, courage, and loyalty of you, the said Benning Wentworth, out of our especial grace, certain knowledge, and meer motion, have thought fit to constitute and appoint, and by these presents do constitute and appoint you, the said Benning Wentworth, to be our governor and commander-in-chief of our province of New Hampshire, within our dominions of New England in America, bounded on the south side by a similar curve line pursuing the course of Merrimac River at three miles distance, on the north side thereof, beginning at the Atlantick Ocean and ending at a point due north of a place called Pautucket Falls, and by a straight line drawn from thence due west cross the said river 'till it meets with our other Governments. * * *

Given at Whitehall July the 3rd, in the 15th year of His Majesty's reign.

(See Documentary History of N. York, vol. 4, page 331.)

The question of the right of territory was submitted to the King, who in 1764 made the following decree:

ORDER IN COUNCIL FIXING THE BOUNDARY BETWEEN NEW YORK AND NEW HAMPSHIRE.

[L. S.] AT THE COURT AT ST. JAMES,
The 20th day of July, 1764.

Present: The King's Most Excellent Majesty; Lord Steward, Earl of Sandwich, Earl of Halifax, Earl of Powis, Earl of Hilsborough, Mr. Vice Chamberlain Gilbert Eliot, Esqr., James Oswald, Esqr., Earl of Harcourt.

Whereas there was this day read at the Board a report made by the right honorable the lords of the committee of council for plantation affairs, dated the 17th of this instant, upon considering a representation from the lords commissioners for trade and plantations, relative to the disputes that have some years subsisted between the provinces of New Hampshire and New York, concerning the boundary line between those provinces, His Majesty, taking the same into consideration, was pleased with the advice of his Privy Council to approve of what is therein proposed, and doth accordingly hereby order and declare the western banks of the river Connecticut, from where it enters the province of the Massachusetts Bay, as far north as the forty-fifth degree of northern latitude, to be the boundary line between the said two provinces of New Hampshire and New York. Whereof the respective governors and commanders-in-chief of His Majesty's said provinces of New Hampshire and New York for the time being, and all others whom it may concern, are to take notice of His Majesty's pleasure hereby signified and govern themselves accordingly.

WM. BLAIR.

(*Vide* Documentary History of New York, vol. 4, p. 355.)

Notwithstanding this decree of the King, controversy, attended with violence, was kept up for many years; but the line was finally accepted and now forms the boundary line between the States of New Hampshire and Vermont.

The northern boundary of New Hampshire was settled by the United States and Great Britain. (*Vide* p. 18 *et seq.*)

It is as follows, viz:

Commencing at the "Crown Monument," so called, at the intersection of the State of New Hampshire, Maine, and the Province of Quebec, in latitude 45° 18′ 23″.33, longitude 71° 5′ 40″.5, thence in an irregular line to Hall's Stream, thence down the same to the northeastern corner of Vermont, in latitude 45° 0′ 17″.58, longitude 71° 30′ 34″.5. (*Vide* Hitch. Geology of New Hampshire.)

VERMONT.

The grants from King Henry, of France, of 1603, and King James, f England, of 1606, both included that territory which forms the presnt State of Vermont. It was also included in the charter of New Engand of 1620.

In the grants to the Duke of York, in 1664 and 1674, all the territory etween the Connecticut and Delaware Rivers was included. New ork, therefore, claimed jurisdiction of the territory now known as ermont. Massachusetts, however, at an early period, having made laim to the tract west of the Connecticut River, now a portion of that tate, by the interpretation of her charter, claimed the greater part of he same territory. By the terms of the charter of Massachusetts Bay, f 1629, that colony was granted all the lands—

> Which lye and be within the space of Three English myles to the northward of the saide River called Monomack alias Merrymack, or to the norward of any and every Parte thereof.

Under this clause Massachusetts Bay claimed that her jurisdiction extended 3 miles north of the farthest part of the Merrimac River, which would embrace a large portion of New Hampshire and Vermont. New Hampshire contested this claim, and after several years' controversy was more than sustained by a decision of the King in 1740. New Hampshire in her turn claimed the territory of Vermont, on the ground that Massachusetts and Connecticut, having been allowed to extend their boundaries to within 20 miles of the Hudson River, her western boundary should go equally as far, and contended that the King's decree of 1740 left that fairly to be inferred; also, that the old charters of 1664 and 1674 were obsolete.

By a decree of the King, however, the territory west of the Connecticut River, from the 45th parallel of north latitude to the Massachusetts line, was declared to belong to the province of New York. (*Vide* New Hampshire, p. 50.)

As most of the settlers of Vermont were from New Hampshire, this decision of the King caused great dissatisfaction, and the Revolution found Vermont the scene of conflicting claims, and the theatre of violent acts, culminating, in some instances, in actual bloodshed.

On January 15, 1777, Vermont declared herself independent and laid claim to the territory west as far as Hudson River, and from its source north to the international boundary, including a tract along the west shore of Lake Champlain. A part of New Hampshire, also, at one time, sought a union with Vermont.

In 1781 Massachusetts assented to her independence. She adjusted her differences with New Hampshire in 1782, but eight years more passed before New York consented to her admission into the Union.

In 1791 Vermont was admitted as an independent State, but was required to restrict her boundaries to their present extent.

The act of New York, of March 6, 1790, giving her consent to the admission of Vermont, defines her boundaries. (*Vide* Slade's Vermont, p. 507.)

The northern boundary was settled by the United States and Great Britain by the treaty of Washington, in 1842. (*Vide* p. 18.)

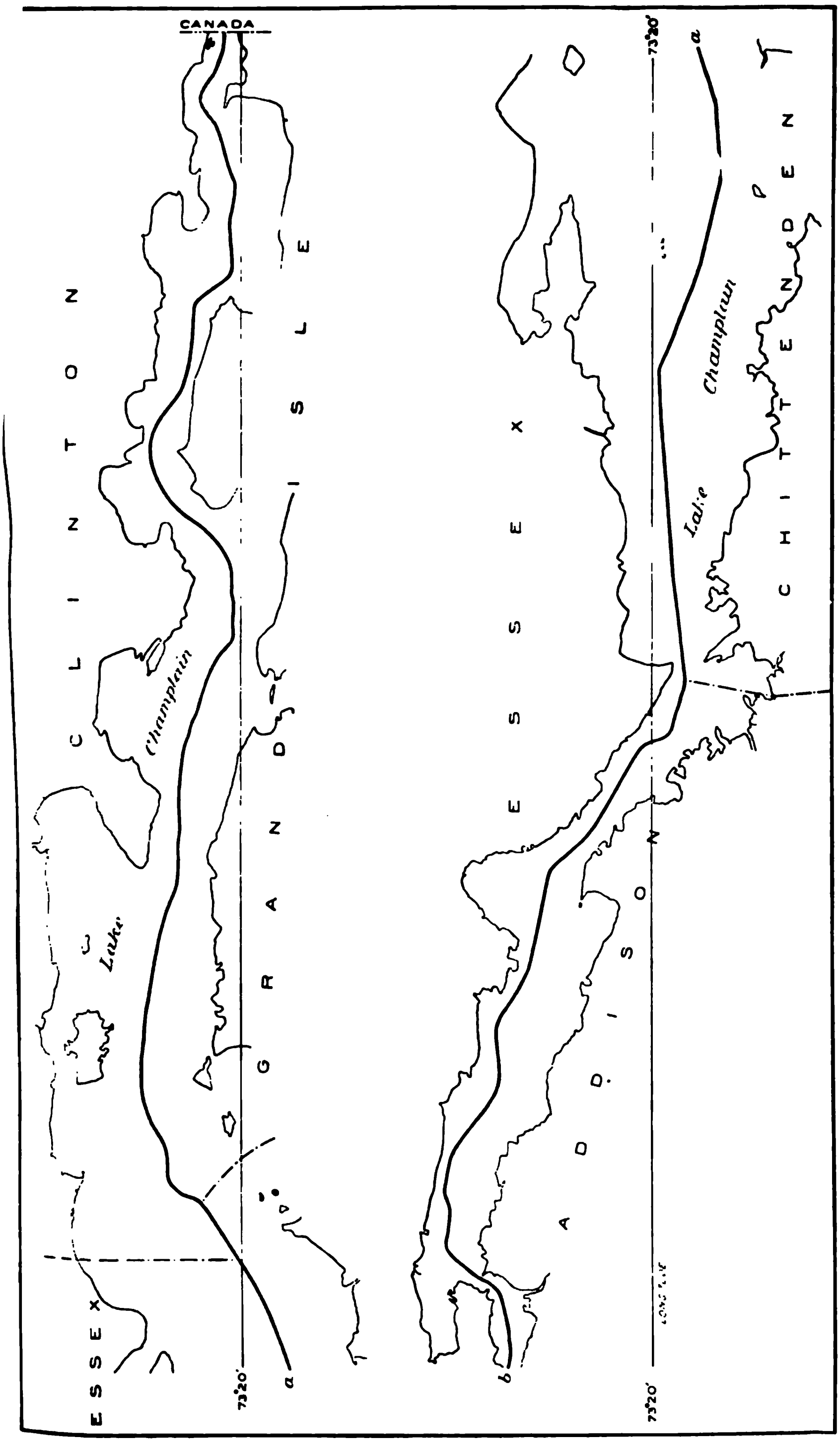
The eastern boundary is low-water mark on the west bank of the Connecticut River. (*Vide* New Hampshire, p. 50.)

The southern boundary was settled by the decree of 1740. (*Vide* New Hampshire, p. 48.)

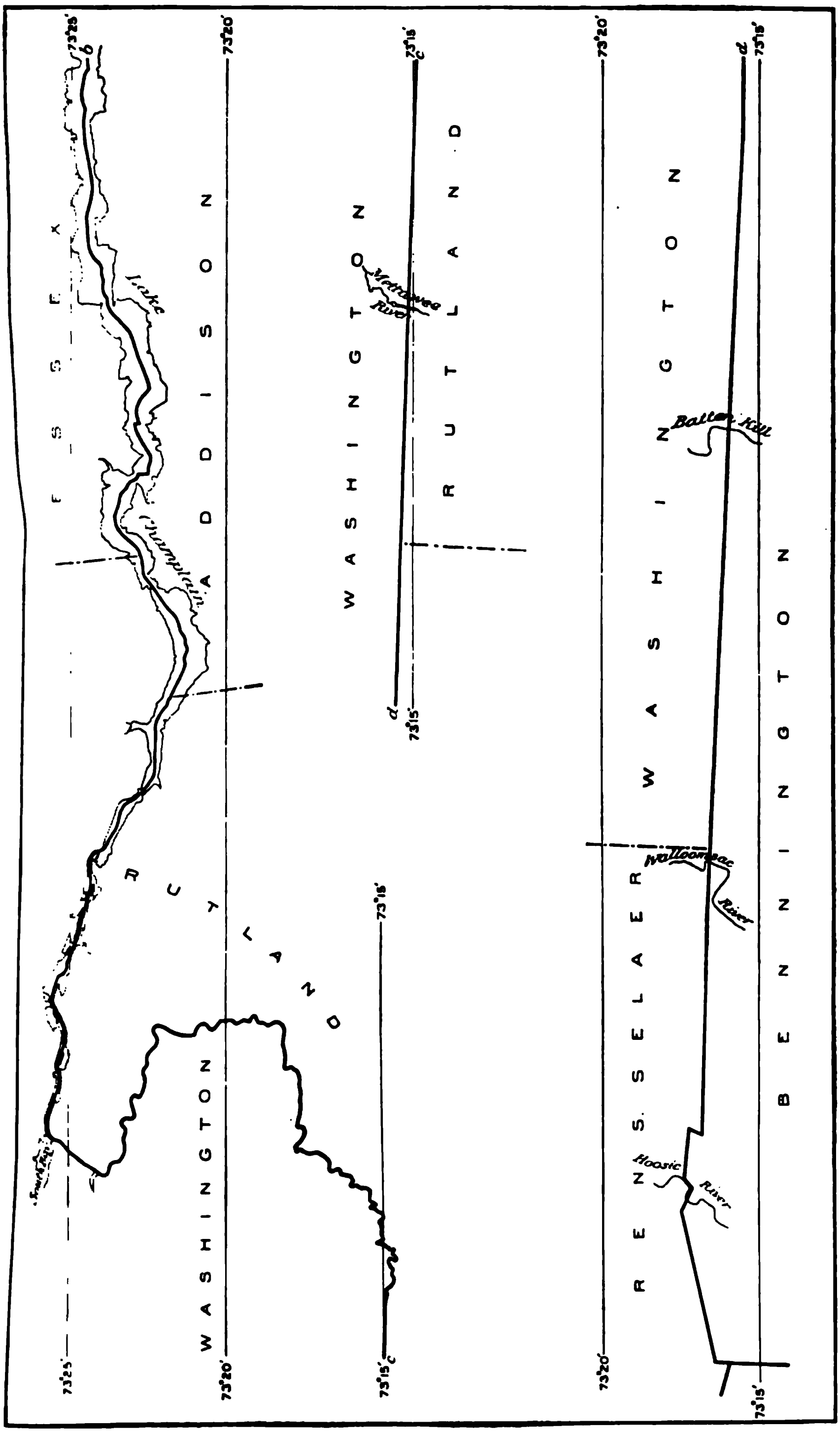
The line between Vermont and New York was surveyed and marked by commissioners from the two States in 1814, and is as follows, viz:

Beginning at a red or black oak tree, the northwest corner of Massachusetts, and running north 82° 20′ west as the magnetic needle pointed in 1814, 50 chains, to a monument erected for the southwest corner of the State of Vermont, by Smith Thompson, Simon De Witt, and George Tibbitts, commissioners on the part of New York, and Joseph Beeman, jr., Henry Olin, and Joel Pratt second, commissioners on the part of the State of Vermont, which monument stands on the brow of a high hill, descending to the west, then northerly in a straight line to a point which is distant 10 chains, on a course, south 35 degrees west, from the most westerly corner of a lot of land distinguished in the records of the town of Pownal, in the State of Vermont, as the fifth division of the right of Gamaliel Wallace, and which, in the year 1814, was owned and occupied by Abraham Vosburgh; then north 35 degrees east to said corner and along the westerly bounds of said lot, 30 chains to a place on the westerly bank of Hasick River, where a hemlock tree heretofore stood, noticed in said records as the most northerly corner of said lot; then north 1 degree and 20 minutes west, 6 chains to a monument erected by the said commissioners, standing on the westerly side of Hasick River, on the north side of the highway leading out of Hasick into Pownal, and near the northwesterly corner of the bridge crossing said river; then north 27 degrees and 20 minutes east, 30 chains, through the bed of the said river, to a large roundish rock on the northeasterly bank thereof; then north 25 degrees west, 16 chains and 70 links; then north 9 degrees west, 18 chains and 60 links, to a white-oak tree, at the southwest corner of the land occupied in 1814 by Thomas Wilsey; then north 11 degrees east, 77 chains to the north side of a highway, where it is met by a fence dividing the possession of said Thomas Wilsey, jr., and Emery Hunt; then north 46 degrees east, 6 chains; then south 66 degrees east, 26 chains and 25 links; then north 9 degrees east, 27 chains and 50 links to a blue-slate stone, anciently set up for the southwest corner of Bennington; then north 7 degrees and 30 minutes east, 46 miles 43 chains and 50 links to a bunch of hornbeam saplings on the south bank of Poultney River, the northernmost of which was marked by said last-mentioned commissioners, and from which a large butternut tree bears north 70 degrees west, 30 links, a large hard maple tree, south 2 chains and 86 links, and a white ash tree on the north side of said river, north 77 degrees east.

Which said several lines from the monument erected for the southwest corner of the State of Vermont were established by said last-mentioned commissioners, and were run by them, as the magnetic needle pointed, in the year 1814, then down the said Poultney River, through the deepest channel thereof to East Bay; then through the middle of the deepest channel of East Bay and the waters thereof to where the same communicate with Lake Champlain; then through the deepest channel of Lake Champlain to the eastward of the islands called the Four Brothers, and the westward of the islands called the Grand Isle and Long Isle, or the Two Heroes, and to the west-



BOUNDARY BETWEEN VERMONT AND NEW YORK.



BOUNDARY BETWEEN VERMONT AND NEW YORK.

ward of the Isle La Motte to the line in the 45th degree of north latitude, established by treaty for the boundary line between the United States and the British Dominions. (See Revised Statutes of New York, Banks & Brothers, sixth edition, Vol. I, pp. 122–123.)

This line was changed in 1876 by a cession of a small territory from Vermont to New York, described as follows, viz:

All that portion of the town of Fairhaven, in the county of Rutland, and State of Vermont, lying westerly from the middle of the deepest channel of Poultney River as it now runs, and between the middle of the deepest channel of said river and the west line of the State of Vermont as at present established. (Ratified by Congress April 7, 1880.)

MASSACHUSETTS.

The territory of Massachusetts was included in the first charter of Virginia, granted in 1606, (*Vide* Virginia p., 94) and in the charter of New England, granted in 1620, (*Vide* Maine p. 39.)

In 1628 the council of Plymouth made a grant to the governor and company of Massachusetts Bay in New England, which was confirmed by the King, and a charter was granted in 1629, of which the following are extracts:

* * * Nowe Knowe Yee, that Wee * * * have given and granted * * * all that Parte of Newe England in Amirica which lyes and extends betweene a great River there commonlie called Monomack River, alias Merrimack River, and a certen other River there, called Charles River, being in the Bottome of a certen Bay there, comonlie called Massachusetts alias Mattachusetts, alias Massatusetts Bay, and also all and singuler those Landes and Hereditament whatsoever, lying within the Space of Three Englishe Myles on the South Parte of the said River called Charles River, or of any or every Parte thereof. And also all and singuler the Landes and Hereditaments whatsoever, lying and being with the space of Three Englishe Miles to the southward of the southermost Parte of the said Baye, called Massachusetts, alias Mattachusetts, alias Massatusetts Bay—and also all those Lands and Hereditaments whatsoever, which lye and be within the space of Three English Myles to the Northward of the saide River, called Monomack, alias Merrymack, or to the Norward of any and every Parte thereof and all Landes and Hereditaments whatsoever, lyeing within the Lymitts aforesaide, North and South, in Latitude and Bredth, and in Length and Longitude, of and within all the Bredth aforesaide, throughout the Mayne Landes there from the Atlantick and Westerne Sea and Ocean on the East Parte, to the South Sea on the West Parte.

* * * Provided alwayes, That yf the said Landes * * * were at the tyme of the graunting of the saide former Letters patents, dated the Third Day of November, in the Eighteenth yeare of our said deare Fathers Raigne aforesaide, actuallie possessed or inhabited by any other Christian Prince of State, or were within the Boundes Lymitts or Territories of that Southern Colony, then before graunted by our saide late Father * * * That then this present Graunt shall not extend to any such partes or parcells thereof * * * but as to those partes or parcells * * * shal be vtterlie voyd, theis presents or any Thinge therein conteyned to the contrarie notwistanding * * *

The charter of New England was surrendered to the King in 1635. (*Vide* Plymouth Colony Laws, p. 333.)

The charter of 1629 was canceled by a judgment of the high court of chancery of England, June 18, 1684. (*Vide* C. & C., p. 942.)

In the year 1686, Pemaquid and its dependencies were annexed to the New England government. (*Vide* Maine, p. 40.)

In 1691 a new charter was granted to Massachusetts Bay, which included Plymouth Colony and the Provinces of Maine and Nova Scotia. The following are extracts from this charter:

> * * * Wee * * * do will and ordeyne that the Territories and Collonyes Commonly called or Known by the names of the Collony of the Massachusetts Bay and Collony of New Plymouth the Province of Main the Territorie called Accadia or Nova Scotia and all that tract of Land lying betweene the said Territories of Nova Scotia and the said Province of Main be erected Vnited and Incorporated * * * into one reall Province by the Name of Our Province of the Massachusetts Bay in New England. * * *
>
> All that parte of New England in America lying and extending from the greate River comonly called Monomack als Merrimack on the Northpart and from three Miles Northward of the said River to the Atlantick or Western Sea or Ocean on the South part And all the Lands and Hereditaments whatsoever lying within the limitts aforesaid and extending as farr as the Outermost Points or Promontories of Land called Cape Cod and Cape Mallabar North and South and in Latitude Breadth and in Length and Longitude of and within all the Breadth and Compass aforesaid throughout the Main Land there from the said Atlantick or Western Sea and Ocean on the East parte towards the South Sea or Westward as far as Our Collonyes of Rhode Island Connecticutt and the Narragansett Countrey all alsoe all that part or porcon of Main Land beginning at the Entrance of Pescataway Harbour and soe to pass vpp the same into the River Newickewannock and through the same into the furthest head thereof and from thence Northwestward till One Hundred and Twenty miles be furnished and from Piscataway Harbour mouth aforesid North-Eastward along the Sea Coast to Sagadehock and from the Period of One Hundred and Twenty Miles aforesaid to crosse over Land to the One Hundred and Twenty Miles before reckoned up into the Land from Piscataway Harbour through Newickawannock River and alsoe the North halfe of the Isles and Shoales togather with the Isles of Cappawock and Nantukett near Cape Cod aforesaid and alsoe [all] Lands and Hereditaments lying and being in the Countrey and Territory comonly called Accadia or Nova Scotia And all those Lands and Hereditaments lying and extending betweene the said Countrey or Territory of Nova Scotia and the said River of Sagadahock or any part thereof And all Lands Grounds Places Soiles Woods and Wood grounds Havens Ports Rivers Waters and other Hereditaments and premisses whatsoever, lying within the said bounds and limitts aforesaid and every part and parcell thereof and alsoe all Islands and Isletts lying within tenn Leagues directly opposite to the Main Land within the said bounds. * * *

(For an account of the settlement of the boundary between the District of Maine, formerly a part of Massachusetts, see Maine, p. 41.)

The present northern boundary of Massachusetts was settled in 1741. (For history, see New Hampshire, p. 48.)

The boundary line between Massachusetts and Rhode Island was for more than two hundred years a question of dispute, and was, in some respects, the most remarkable boundary case with which this country has had to do. Twice the case went to the Supreme Court of the United States, and in one of these suits Daniel Webster and Rufus Choate were employed as counsel for Massachusetts.

As early as 1642 the line between the two colonies was marked in part by Nathaniel Woodward and Solomon Saffrey, who set up on the plain of Wrentham a stake as the commencement of the line between Massachusetts Bay and Rhode Island. This stake was by them supposed to mark a point 3 miles south of the Charles River.

The report of these commissioners has not been found, but frequent reference is made to their survey in the record of the subsequent controversies and litigations.

In 1710–'11 commissioners appointed from Massachusetts and Rhode Island agreed upon the north line of Rhode Island. The action of the commissioners was approved by the legislatures of both colonies.

The agreement was as follows, viz:

That the stake set up by Nathaniel Woodward and Solomon Saffrey, skillful, approved artists, in the year of our Lord 1642, and since that often renewed in the latitude of 41° 55′, being 3 English miles distant southward from the southernmost part of the river called Charles River, agreeable to the letters patent for the Massachusetts Province, be accounted and allowed on both sides the commencement of the line between the Massachusetts and the colony of Rhode Island, from which said stake the dividing line shall run, so as it may (at Connecticut River) be 2¼ miles to the southward of a due west line, allowing the variation of the compass to be 9°; which said line shall forever, &c. (*Vide* Howard's Reports, S. C., Vol. 4, p. 631, *et seq.*)

In 1719 this line was run by commissioners appointed for the purpose. Subsequent investigation has shown that this line was run in a very irregular manner. (*Vide* R. I. Acts, May, 1867, page 6, *et seq.*)

The line between Massachusetts and the eastern part of Rhode Island was fixed by commissioners in 1741, from the decision of whom the colony of Rhode Island appealed to the King, who, in the year 1746, affirmed their decision by a royal decree.

The following is a record of the proceedings in council, together with the royal decree.

[Council Office. Council Register. Geo. II, No. 8, p. 204.]

AT THE COURT AT KENSINGTON
the 29th day of July 1742.

Present. The Kings Most Excellent Majesty, Archbp^d^ of Canturbury, Earl of Pembroke, Lord President Earl of Winchelsea, Lord Privy Seal Earl of Grantham, Duke of Bolton, Earl of Cholmondelly, Duke of Rutland, Earl of Wilmington, Marq^s^ of Tweedale, Earl of Bath, Visco^t^ Lonsdale, Mr. Chancellor of the Exche^cr^, Lord Delaware, Sr Charles Wager, Lord Bathurst, Sr. William Younge, Lord Monsore, Sr John Norris, Mr Speaker Thomas Winnington Esq., Mr. Vice Chamberlin, George Wade Esq.

Upon reading this day at the board the humble Petetion and appeale of the Governor and company of the English of Rhode Island and Providence Plantations in New England in America from several particular parts of the determination of the commissioners appointed by his Majesty to settle the Boundary's of the said colony Eastwards with the Province of Massachusetts Bay, and humbly praying that a day may be appointed for hearing said appeal, and that the particular parts of the said commissioners determination appealed from may be reversed, and such other determination made instead thereof as shall be agreeable to the true construction of the Boundarys contained in the Royal Charter under which the Petioners claim, It is ordered by his Majesty in Council that the said Petition and appeal (a copy whereof is hereunto annexed). Be and it is hereby referred to the Right Honorable the Lord of the committee of council for hearing appeals from the Plantations to hear the same, and report their opinion thereupon to his Majesty at the Board.

A true copy.

I. B. LENNARD.

Collated with the original entry in the Council Register, 18 Jan'y, 1845.

ROBT. LEMON.

[Council Office. Council Register. Geo. II, No. 8 p. 296.]

AT THE COURT OF KENSINGTON,
the 15*th day of Sept.* 1742.

Present, The Kings most Excellent Majesty Archbp of Canturbury, Lord Delmar Lord Chancellor, Mr Vice Chamberlin, Duke of Richmond, Mr. Chancellor of the Exchequer, Duke of Newcastle, Harry Pelham Esq. Earl of Winchelsea, Thomas Winnington Esq Earl of Wilmington George Wade Esq. Lord Cartaret.

Upon reading this day at the Board the humble Petition and appeale of His Majesty's Province of the Massachusetts Bay in New England from the determination of the commissioners appointed by His Majesty to settle the Boundary of the Colony of Rhode Island Eastwards, with the said province of Massachusetts Bay and humbly praying that a day may be appointed for hearing the said appeale and that the determination of the said commissioners may be reversed, and such other determination made instead thereof as shall be agreeable to the petioners claim exhibited before the said commissioners—It is ordered by his Majesty in council that the said petition and appeale (a copy whereof is hereunto annexed) Be and it is hereby referred to the Right Honorable the Lords of the committee in council for hearing appeals from the Plantations to hear the same and report their opinion thereupon to His Majesty at the Board.

A true copy.

I. B. LENNARD.

Collated with the original entry in the Council Registry, 18 of Jan'y, 1845.

ROBT. LEMON.

[Ordered in Council, dated 28th May, 1746. Council office. Council Register. Geo. II, No. 10, p. 498.]

AT THE COURT OF KENSINGTON,
the 28*th day of May* 1746.

Present the Kings Most Excellent Majesty in Council

Upon reading at the Board a Report from the Right Honourable the Lord of the committee of council for hearing appeals from the Plantations dated the 11th of December 1744 in the words following vizt.

Your Majesty having been pleased by Your Order in council of the 29th of July 1742 to refer unto this committee the humble petition and appeale of the Governor and company of the English Colony of Rhode Island and Providence Plantations in New England in America, from several particular parts of the determination of the commissioners appointed by your Majesty to settle the Boundarys of said colony eastwards with the Province of Massachusetts Bay and humbly praying that the particular parts of the said commissioners determination appealed from may be reversed, and such other determinations made instead thereof, as shall be agreeable to the true construction of the Boundarys continued in the Royal Charter under which the petitions claim—and your Majesty having been also pleased by another order in council of the 15th of September 1742, to refer unto this committee, the humble Petition and appeal of your Majesty's Province of the Massachusetts Bay in New England parte of the said determination of the said commissioners, and humbly praying that the same may be reversed and set aside and that instead thereof Your Majesty will be graciously pleased to give such judgement and determinations as shall be agreeable to the petitioners claim exhibited before the said commissioners. The Lords of the committee in obedience to your Majesty's said orders of Reference, have met several times, and taken both the said Petitions of Appeale into their consideration, and having examined into the Proceedings of the said commissioners, do find that they pronounced their judgements or determination on the 30th of June 1741 in the words following:

The court took into consideration, the charters, Deeds and other Evidences, Claims Pleas and allegations produced and made by party refering to the controversy before them and after mature advisement, came to the following Resolutions: That there is not any one Evidence proving that the Water between the Main Land on the East, and Rhode Island on the West, was ever at any time called Naragansett River, that though there be evidence that the place where the Indian called King Philip lived near Bristol, was called Pawconoket, and that another place near Swanzey was called Sowams or Sowamsett, yet no evidence has been produced of the extent of the Pawconoket country to Seaconk, or Pawtucket River, as it runs to the line of the late Colony of the Massachusetts Bay, for tho' there be some evidence that the Indians at enmity with King Philip, or with other Indians in enmity with him, lived on the west side of the said River, and that the Indians subject to King Philip, or in amity with him, lived on the East side of the said River there is no Evidence that all the Indians subject to, or in amity with King Philip, lived in the Pawconoket Country. That the Province not having produced the Letters Patent, constituting the council of Plymouth, nor any copy thereof, the Recital of said Letters Patent in the deed from the council of Plymouth, to Bradford and his associates, is not sufficient evidence against the Kings Charter. That the council of Plymouth being a Corporation, could not create another corporation, and that no Jurisdiction within the Kings Dominions in America can be held by Prescription or on the Foot of Prescription. That the determination of the boundarys of the colony's of Rhode Island and New Plymouth by the Kings Commissioners in the year 1664 appear to have been only a temporary order for preserving the Peace on the Borders of both Colonys without determining the Rights and Titles of either. Upon the whole nothing appears whereby the Colony of Rhode Island and Providence plantations can be barred or hindered from extending their Jurisdiction Eastward towards the Province of the Massachusetts Bay according to the true intents and meaning of their charter. But some dispute having arisen between the Partys as to the true construction and meaning thereof, the court is of opinion, That the Narragansett Bay is and extendeth itself from Point Judith in the west to Seaconet Point on the East and including the Islands therein, layeth and extendeth itself unto the mouth of the River which runnith towards the town of Providence and that as it so lies or extends, it has and may be considered as having one Eastern Side at the Eastern coast of the said Bay runs up northerly from Seconets Point,—and one other North Eastern Side from near Mount Hope to Bullocks Neck, as the said Bay runs up North Westerly towards the Town of Providence and that the land adjacent to the said North Eastern and Eastern Coasts and including within the following lines and the said Bay are within the Jurisdiction of the Colony of Rhode Island; Vizt on the North East side of the said Bay—one line running from the south west corner of Bullocks Neck, Northeast three Miles. One other line running from the Northeast extremity of the said line until it be terminated by a line three miles Northeast from the northeasternmost part of the Bay on the west side of Rumstick Neck, and one other line from the termination of the west line to the Bay at or near Towoset Neck, running so that it touch the North East extremity of a line running three miles North East from the North East corner of Bristol Harbour, and on the Eastern side of the said Bay; One line from a certain point on the Eastern side of the said Bay opposite to the southernmost part of the Shawmuts Neck, and four hundred and forty Rods to the Southwards of the Mouth of Fall River running East three miles; One other line running from the Easternmost extremity of the said line till it be terminated by the Easternmost end of a line three miles East from the Easternmost part of a cove in the said Bay which is to the southward of Nawquaket and one other line from the termination of the last line to the sea, running on such course, as to be three miles East from the Easternmost part of the Bay adjoining to Scitchuwest on Rhode Island, and that the said Distances of three miles East and Northeast, are to be measured from high Water Mark, and this court doth hereby settle, adjust and determine, that the Eastern Boundary of the said Colony of Rhode Island and Providence Plantations, towards the Massachusetts Bay, is, shall be and runs from a certain Pointe (where a Meridian line passing through Pawtuckets Falls, cuts the South Boundary of the Colony of Massachusetts Bay), south to Pawtuckets Falls, Then southerly along the eastward side of Seaconk River, and the River which runnith towards the Town of Providence, to the Southwest corner of Bullock's Neck, then Northeast three miles; and then along the aforesaid lines running at three miles distance from the Easternmost parts of the said Bay to the said Bay, at or near Towoset Neck. Then as the said Bay runs to the southernmost point of Shawmuts Neck, and then in a straight line to the aforesaid point opposite to the said Neck. Then East three miles and then along the aforesaid lines, running at three miles distance from the Easternmost parts of the said Bay, to the sea. All which lines are to be run by making the proper allowance for the variation of the Magnetic Needle from the Meridian. And for the better understanding of the description of the lines before mentioned; the Court hath caused the Boundary lines of the lands adjacent to the said most eastern and Northeastern points of the Said Bay, to be delineated on the Map or Plan of the said Bay and countries adjacent now in court, and the same are distinguished on the said Map or Plan, by A, B, C, D, E, F, G, H.

The Lord of the Committee having considered the whole matter and heard all partys concerned therein by their Council learned in the Law, Do agree humbly to report to your Majesty as their opinion, That the said Judgment or determination of the said Commissioners should be affirmed, and both the Petitions of Appeal therefrom dismissed.

His Majesty this day took the said Report into consideration and was pleased with the advice of the Privy Council to approve thereof, and to order, that the said Judgment or Determination of the said Commmissioners, Be, and it is hereby Affirmed And both the said Petitions of Appeal therefrom dismissed.

Whereof the Governor or the Commander in Chief of His Majesty's Province of the Massachusetts Bay, The Governor and Company of the colony of Rhode Island and Providence Plantations for the time being, and all others whom it may concern, are to take notice and govern themselves accordingly.

A true Copy.

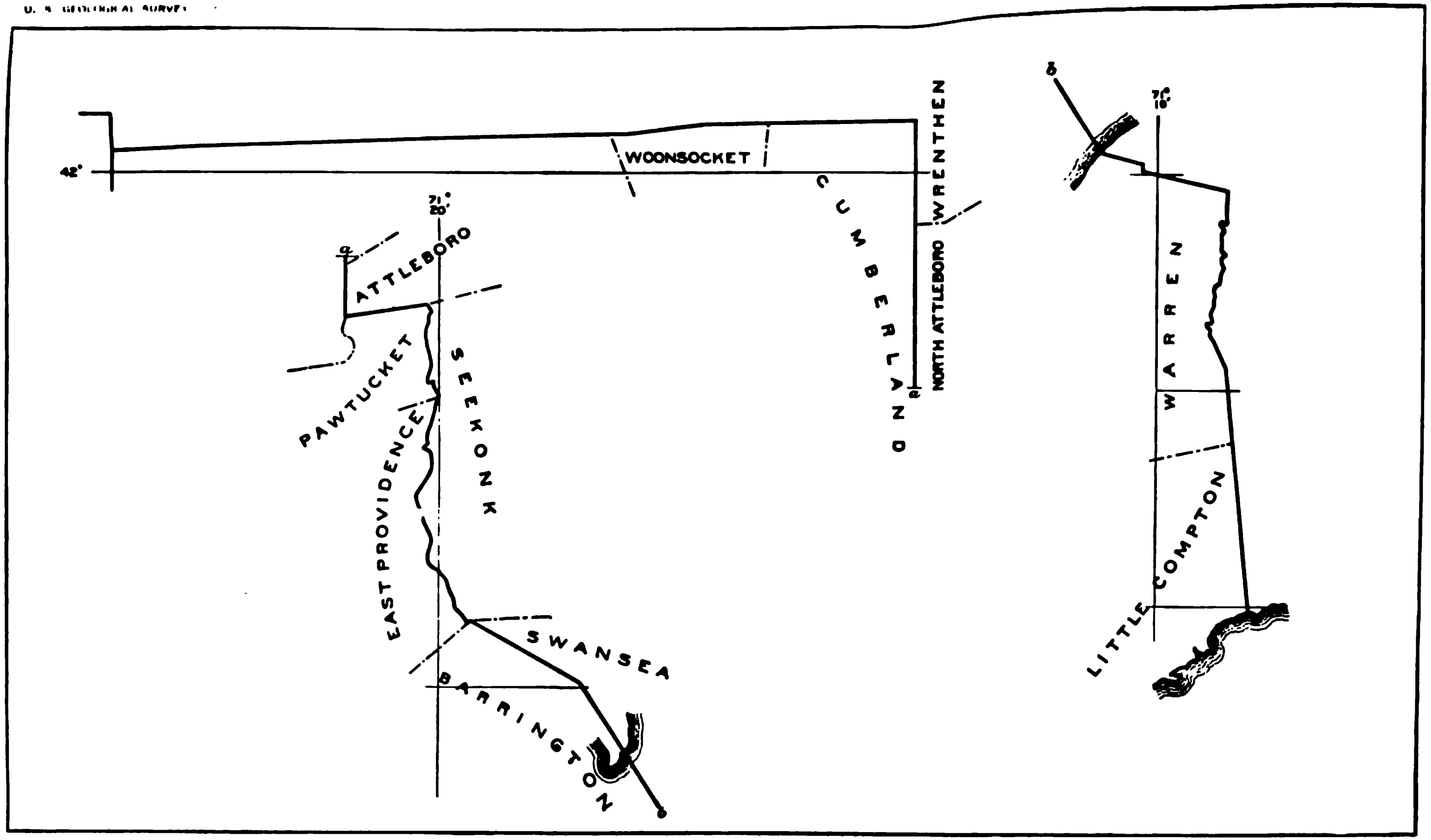
I B LENNARD.

Colated with the Original entry in the Council Register, 18 January, 1745.

ROBT LEMON.

Under the foregoing decree the line was run by commissioners appointed for the purpose, whose report was as follows, viz:

We, the subscribers, appointed commissioners by the general assembly of the colony aforesaid, to mark out the bounds of said colony eastward towards the province of Massachusetts Bay, agreeable to His Majesty's royal determination in council, the 28th day of May, 1746, did in pursuance thereof, on the second day of December last past, meet at Pawtucket Falls, in expectation of meeting with commissioners that might be appointed by the province of the Massachusetts Bay, for the purpose aforesaid; and after having there tarried till the afterpart of said day, and no commissioners in behalf of the said province appearing, we proceeded to run a due north line



BOUNDARY BETWEEN MASSACHUSETTS AND RHODE ISLAND.

m Pawtucket Falls to the south boundary of the aforesaid province of the Massa-
usetts Bay, in manner following, viz: From a certain point on the southern side of
wtucket Falls, where we erected a monument of stones, with a stake thereon, we run
neridian line which directly passed through said falls, to a walnut tree on the north-
ly side of said falls; then to a pitch pine tree; then to a small white oak; then to
grey oak; then to a small bush; then to another small bush with stones about it;
en to a heap of stones with a stake thereon; then to a black oak tree; then to an-
her black oak; then to a small pitch pine; then to a black oak; then to a large
hite oak near the river, called Abbot's Run; then to a poplar tree; then to a heap
stones with a stake thereon; then to a large rock with stones thereon; then to a
all black oak tree; then to a walnut tree; then to a black oak; then to divers
her marked trees in the said course, to the extremity of said line; and when we
me near the termination of the said line made a monument of stones, there being
noted south boundary of the said province near the said line, and therefore, for the
covery of the south boundary of the said province, upon the best information we
ald obtain, proceeded to Wrentham Plain, at or near to a place where was formerly
ected a stake, called Woodward's and Saffery's stake, as one remarkable south
undary of the said province, and from thence run a west line, making an allowance
eight degrees and a half as the west variation of the magnetic needle from the true
eridian, it being the course of the south line of the said province, according to their
arter (as we apprehended), and then we extended the said north line from the
oresaid monument till it intersected the said west line, and upon the point of its
tersection erected a monument of stones with a stake thereon, as the northeast
undary of that tract of land commonly called the Gore.

After which we proceeded to Bullock's Neck, and on the southeast corner thereof
ected a red cedar post, marked with the letters J. H. C. R., with the figure of an
nchor thereon, and from thence running a line northeast making the same allowance
r the variation aforesaid, to a black oak tree marked with the letters G. C. C. R.,
hen to a large white oak marked with the letters G. B. C. R., then to a white oak
ost, set in the ground with a heap of stones around it, marked with the letters G. W.
. R., with the figure of an anchor thereon, being three miles distant from Bullock's
eck aforesaid.

After which we proceeded to the northeasternmost part of the bay on the west side
Rumstick Neck, and from a point where a locust post was erected, run a line three
iles northeast, with the same allowance for the variation and at the extremity of
e said line erected a monument of stones, from which we run a line to the northeast
tremity of that line drawn from the southwest corner of Bullock's Neck aforesaid,
e course whereof being west thirty-eight degrees north, according to the magnetic
edle, the distance of nine hundred and fifty-five rods, marking trees and making
her boundaries in the course of said line. After which we proceeded to the north-
st corner of Bristol Harbour, and from high-water mark, which was some rods dis-
nt northeast from the bridge leading to Swanzey Ferry, we ran a line three miles
rtheast, still making the same allowance for the variation, and at the extremity
which line we erected a monument of stones; then we ran a line from the north-
st extremity of the line drawn from Rumstick aforesaid, the course whereof being
uth twenty-five degrees east, till it met with the termination of the line drawn from
istol Harbour aforesaid, the distance whereof being nine hundred and twenty-seven
ds; and from thence to a straight line to the bay at Towoset Neck, making proper
undaries in the course of said line.

After which we proceeded to the eastern side of the Narragansett Bay, and on the
sternmost part of a cove in the said bay, which is southward of Nanequachet, ran a
ne three miles east (still making the same allowance for variation), at the extremity
hereof we marked a grey oak tree with the letters C. R., with the figure of an anchor
ereon.

After which we proceeded to the mouth of Fall River, and from thence measured

In 1860 both States agreed upon a conventional line, and asked that a decree of the United States Supreme Court should confirm the same, which prayer was granted, and the line was thus finally established by a decree rendered in the December term, 1861, which is as follows, viz:

Beginning at Burnt Swamp Corner (so called), in Wrentham, in latitude 42° 01′ 08″ north, longitude 71° 23′ 13″ west of Greenwich, being the northeasterly corner of Rhode Island.

Thence in a straight line to the center of a stone monument in the division line, between Attleborough and Pawtucket, on the easterly bank of the Blackstone River, being in latitude 41° 53′ 36″ north, longitude 71° 23′ 14″ west.

Thence easterly, by the northerly line of the town of Pawtucket, to a point where said line intersects the highest water mark on the easterly side of Farmer's or Seven Mile River, which point is shown on accompanying sheet marked "A," and designated as "Bound No. 1," being in latitude 41° 53′ 54″ north, longitude 71° 20′ 40″ west.

From Bound No. 1 the line runs southerly, following the highest water mark on the easterly side of Farmer's or Seven Mile River, as designated in said sheet marked "A," to its junction with the highest water mark on the southerly and easterly side of Ten Mile River, at a point designated as " Bound No. 3."

From Bound No. 3 the line runs southerly, following the highest water mark on the southerly and easterly side of said Ten Mile River, as shown on sheet marked "A," to a point designated as "Bound No. 13," said last point being at the most southerly bend of Ten Mile River in said line of highest water mark.

The line of "highest water mark" as shown on sheet A is defined by offsets at right angles to straight lines shown on said plan in blue ink, from Bound No. 1, and passing through points designated as bounds numbered 2 to 13, inclusive.

From Bound No. 13 the line runs southeasterly, being a straight line to the center of a stone pier in the middle of Runnin's River, on the north side of the road leading by Luther's store.

Thence through the center or middle of said Runnin's River as the same is at low water at a point when such line intersects the dividing line between Barrington and Seekonk, being in latitude 41° 46′ 28″, longitude 71° 19′ 23″.

Thence northeasterly, following the dividing line between Barrington and Seekonk, to a point at the northerly extremity of the dividing line between Barrington and Swanzey, in latitude 41° 36′ 34″, longitude 71° 19′ 30″.

Thence in a straight line southeasterly to the center of a copper bolt in King's Rock, so called and well known, near an ancient monument on said King's Rock, being on the west side of the road leading from Warren to Swanzey. This point is in latitude 41° 45′ 22″.98, longitude 71° 16′ 35″.75.

From King's Rock the line follows the dividing line between Warren and Swanzey to Mount Hope Bay, running in a straight line southeasterly to a point on the Birch Swamp Farm, in latitude 41° 45′ 08″, longitude 71° 15′ 58″.5.

Thence in a straight line to Mount Hope Bay, passing through the center of a copper bolt in a bowlder, in line of extreme high water at Toweset, to low-water line of said bay. This bolt is in latitude 41° 42′ 45″.27, longitude 71° 13′ 54″.70.

From Toweset the line runs southeasterly, crossing Mount Hope Bay, to the westerly end of line dividing Fall River and Tiverton, where the same intersects low-water line of said Mount Hope Bay.

Thence easterly, following said dividing line between Fall River and Tiverton, passing through the middle of a town way on the north side of farm belonging to John Chase, and through the southerly end of Cool's Pond, in a line passing through the middle of a highway, eight rods wide.

Thence running southerly through the center of said eight-rod highway to a point in line with the stone wall on northerly side of farm of Edmund Estes. This wall is easterly of the Stafford road (so called.)

Thence running easterly in line with said wall to a point in line of highest water mark on the westerly shore of South Watuppa Pond, which point is shown on accompanying sheet marked "B," and designated as "Bound A."

From Bound A the line runs southerly, following the highest water mark on westerly side of South Watuppa Pond, and of Sawdy Pond, and of the streams connecting said ponds, as shown on said sheet marked "B," to a point designated as "Bound F," said last point being at the most southerly end of Sawdy Pond in said line of highest water mark.

The line of "highest water mark" as shown on sheet B is defined by offsets at right angles to straight lines from Bound A, and passing respectively through points designated "B" to "F," inclusive, and on the South Watuppa Pond is also the line that would be traced by a level thirteen inches above a bolt in stone work on westerly side of waterway in gate-house of reservoir dam of Watuppa Reservoir Company, Quequechan River. On Sawdy Pond the highest water mark is the line that would be traced by the level of an iron bolt driven in west side of flume to saw-mill at northerly end of said Sawdy Pond.

From Bound F the line runs southeasterly, being a straight line to the monument known as "Joe Sanford's bound," being the center of a copper bolt in stone on land of Joseph Tripp, and is in latitude 41° 35′ 37″ longitude 71° 08′ 13″.

From Joe Sanford's bound the line runs southerly, following the westerly line of the town of Westport to the Atlantic Ocean, passing easterly of Quicksand Pond through the center of a bound known as Peaked Rock, situated in latitude 41° 29′ 58″, longitude 71° 07′ 34″.

The first point in this line southerly of Sanford's bound is on the north side of mill-dam at Adamsville, 85.58 feet easterly of straight line from Sanford's to Peaked Rock.

The second is 113.94 feet easterly of said straight line, and is on the easterly side of road leading from Adamsville to the ocean.

The third is 234.48 feet east of said straight line, on the road leading to Little Compton, by Philip Simmons' house.

The whole of the line thus described is shown on a plan herewith presented, which, with Sketches A and B, is made a part of this report and attested.

It will be observed that the above decree of the United States Supreme Court makes no reference to the line from Burnt Swamp Corner to the Connecticut line.

It will also be remembered (*vide* p. 61) that the "line of 1848," so called, was ratified by Rhode Island and rejected by Massachusetts. In 1865 the legislature of Massachusetts took action in regard to this portion of the line, as follows, viz:

> *Resolved*, That the boundary line between the State of Rhode Island and the Commonwealth of Massachusetts, from the line of the State of Connecticut to Burnt Swamp Corner, begins at the northwest corner of the State of Rhode Island on the Connecticut line, in latitude 42° 00′ 29″ north, and longitude 74° 48′ 18″ west of Greenwich,[1] and runs in a straight line 21 add $\frac{418}{1000}$ miles to Burnt Swamp Corner, in Wrentham, being in latitude 42° 1′ 8″ and longitude 71° 23′ 13″.

This is the line agreed upon by the commissioners, called the "line of 1848," ratified at the time by Rhode Island, but rejected by Massachusetts.

The tardy ratification of the line by Massachusetts was, in its turn, rejected by Rhode Island, on the ground that the then recent settlement of the eastern boundary by the decree of the Supreme Court had so changed the aspect of the controversy that she could not consent to the adoption of the line of 1848 as her northern boundary.

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[1] This is a clerical error. "Longitude 74° 48′ 18″" should read "longitude 71° 48′ 18″." (*Vide* Borden's Tables, p. 64).

Thus the northern boundary of Rhode Island was left in abeyance, or rather left in the condition prescribed by the decision of 1846.

In June, 1880, the legislature of Rhode Island passed a resolution to remove the monuments of the "line of 1848" and erect monuments on the jurisdictional line.

In 1881 the legislature of Massachusetts took like action.

This jurisdictional line has the same termini as the line of 1848, but is a very irregular line, sometimes running north of a direct line and sometimes falling south of it [the extreme variations being 529.3 feet north of the line of 1848, and 129 feet south of the same.] A full and detailed description may be found in Rhode Island acts, May, 1867, p. 6 *et seq.*

Also, *vide* Senate Document No. 14, Massachusetts, 1848, for a full account of this controversy.

In 1713, commissioners from the Province of Massachusetts Bay and Colony of Connecticut settled a line between Massachusetts and Connecticut.

By this line certain northern frontier towns were given to Massachusetts, viz: Woodstock, Suffield, Enfield, and Somers. In 1749 the legislature of Connecticut passed a resolution that, inasmuch as the line had not been approved by the King, and that the two colonies had no legal right to transfer territory without the confirmation of the Crown, the contract was void, and these towns were again taken under the jurisdiction of Connecticut. Massachusetts appealed to the King, and the claims of Connecticut were fully established. (See Hollister's History of Connecticut, Vol. II.)

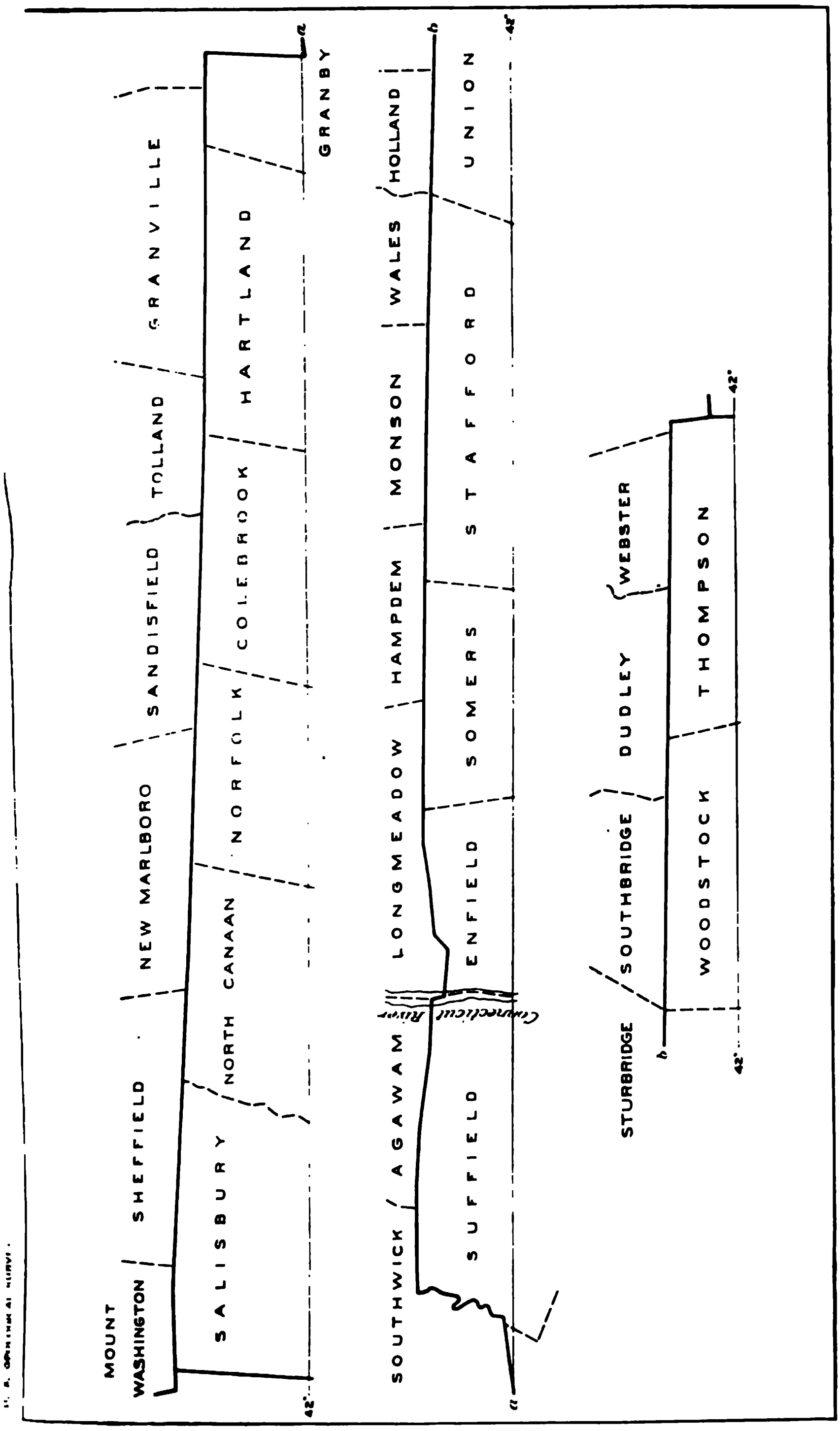
In 1791 Massachusetts and Connecticut appointed commissioners to establish the boundary between them, but they were unable to agree.

In 1803 commissioners were appointed to complete the line, a compromise having been made concerning the line between the town of Southwick and the towns of Suffield and Granby (the cause of the disagreement of the former commissioners).

The agreement made was as follows, viz:

> That the line should begin from a station 8 rods south of the southwest corner of West Springfield, and thence run west to the large ponds, and thence southerly by those ponds to the ancient south line of Westfield, and from thence on said south line to the ancient southwest corner of Westfield; and from thence northerly in the ancient west line of Westfield to the station in said west line made by commissioners in the year 1714, and from thence to the southwest corner of Granville. (See Mass Special Laws, Vol. III, page 234.)

In 1803 the commissioners surveyed and marked the boundary between their respective States.



U. S. GEOLOGICAL SURVEY.

BOUNDARY BETWEEN MASSACHUSETTS AND CONNECTICUT.

Their report, which was adopted, is as follows, viz:

Beginning at the northeast corner of Suffield and the southeast corner of West Springfield, on the west bank of Connecticut River, at a point 75 links northward of the center of a small valley running into said river, said point being between a small butternut tree, marked M. C., standing on the south, and a small crooked white oak, marked M., standing on the north, about two feet distant from each other, and then run north 82° 45′ west 1 chain to a stone monument erected by us there; in the same course 22 chains 25 links to a stone monument on the stage road from Springfield to Suffield, and said course continued would pass two feet north of Smith's house; thence north 82° west 82 chains 3 links to a stone monument on the middle road from Suffield to Springfield; then in the same course 13 chains 30 links to a large black or red oak tree, marked on the east side C., and on the west side M., being an ancient bound; thence north 77° 4′ west 134 chains 42 links to a stone monument on the road from Feeding Hills meeting-house to Suffield; thence in the same course 4 chains 21 links to a pine stump—an old monument; thence north 79° 48′ west 102 chains 80 links to a stone monument on the road from Westfield to Suffield, called the back street; thence north 81° 30′ west 61 chains 20 links to a stone monument at an old stump and stones, the ancient southwest corner of West Springfield; thence south 5° west 2 chains to a stone monument in the line run by commissioners in 1714; thence north 85° west 167 chains 33 links to a stone monument at the middle pond, 22 links east of low-water mark, being at the center of a little valley running into said pond; thence on the eastern shore of said pond, as the same runs southerly, to a sluice way or outlet from said pond to the south pond; thence southerly on the east shore of the south pond as the same runs to a stone monument at high-water mark on the south corner of said pond, being the south end of the most southerly bay thereof, from which the point of land beyond the bay on the east side of the pond bears north 29° east, and the high point beyond the bay on the west side of the pond is north 3° 30′ east; then south 10° 20′ west 24 chains 78 links to a stone monument at the southeast corner of Southwick, in the ancient south line of Westfield, from which the highest peak of Manatick Mountain bears south 42° 30′ west; thence south 87° 30′ west 33 chains 86 links to a heap of stones in a hedge, being an ancient monument in the south line of Westfield and the northwest corner of Suffield, adjoining Granby; thence in said ancient south line of Westfield the same course to a stone monument at a white oak stump, an old monument, the southwest corner of Southwick, being 174 chains 36 links; thence north 10° 20′ east 212 chains 84 links to a stone monument erected by us, at a place in the ancient west line of Westfield, where commissioners in 1714 established the monument called the Crank monument; thence north 82° 17′ west 137 chains to a stone monument erected by us at the east road from Granby to Granville; in this course, at the distance of 86 chains 20 links from the Crank monument, we passed between two pillars of stones 45 links south of one and 13 links north of the other, both said to be the southeast corner of Granville; thence on the same course 61 chains 40 links to a stone monument erected by us on the Granby turnpike road; thence in the same course 44 chains to a white-oak[4] tree, marked by commissioners in 1717, and which we marked M on the north side and C, 1803, on the south side; thence north 84° 24′ west 5 chains 13 links to a stone monument erected by us on the west road from Granby to Granville; thence in the same course 200 chains 37 links to a white elm stump and stones on the west bank of Valley Brook, so-called, a monument, made by commissioners in 1717 in this course three monuments are mentioned by said commissioners, which we do not find; thence north 85° 7′ west 60 chains 15 links to a stone monument erected by us at a new road near the east bank of Hubbard River; thence the same course 2 chains to dry hemlock tree with stones about it on the west side of said river near a small fall and a rock on the east side of said river stooping towards it more than 2 rods to a monument erected by said former commissioners; thence north 82° 52′ west 109 chains 35 links to a stone monument[5] erected by us on the road from Granville to Hartland; thence the same course 275 chains 91 links to a large heap of stones on the west bank of Slocum Brook between two hemlock trees, having many ancient and modern marks thereon, being a monument made by said former commissioners; in this course, the commissioners of 1717 made mention of a large hemlock tree, and a very large white-ash tree which we do not find; thence north 81° 50′ west 93 chains 74 links to a stone monument erected by us on the Beach-hill Road, so-called; thence in the same course 235 chains to a stone monument erected by us at a heap of stones about an elm tree standing on the west bank of Sandy Brook, a monument made by said former commissioners, who mentioned in their report a monument in this course, which we do not find; thence north 82° 11′ west 357 chains 30 links to a stone monument erected by us on the road from Marlborough to Norfolk; thence same course 38 chains 20 links to a monument made by said former commissioners on the west bank of Whiting River, near falls, being a heap of flat stones on a large rock; thence north 82° 9′ west 219 chains to a stone monument at the end of Greenwood Turnpike road; in this course said former commissioners marked two trees, which we do not find: thence in the same course 161 chains 75 links to a stone monument at the Burrell Road, so-called, leading from Canaan to Suffield; thence in the same course 49 chains to an elm tree, with stones near it, on the east bank of Housatonic River, about six rods west from a chestnut stump and stones, a monument made by said former commissioners, who also marked a white oak tree in this course which we not find; thence north 82° 52′ west 20 chains 50 links to a stone monument erected by us at the road leading from Salisbury to Sheffield, called Wetany Road; thence in the same course 119 chains 50 links to a stone monument erected by us at the road from Salisbury to Sheffield, near Ebenezer Fletcher's house; thence on the same course 211 chains 35 links to a stone monument erected by us at the mountain road from Salisbury to Sheffield; thence on the same course 28 chains 4 links to a monument established by said former commissioners at the foot of the mountain, being a heap of stones on a large rock, 20 links long on the northeasterly side, 5 feet high on the southerly side, and which we marked 1803 on the southerly side; thence north 85° 30′ west 147 chains 20 links to a stone monument erected by us on the road from Salisbury to Mount Washington; thence on the same course 81 chains 80 links to a large heap of stones, the oblong corner bounds, so-called between the State of Connecticut and New York.

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[4] Oak-tree boundary at Granville, marked in 1717.

* * * * * * *

The courses of said line as before given, and here by us are according to the present state of Magnetic needle, which we observed to vary 5° west of north. (See Private Laws of Conn., vol. 2, pages 1540 to 1544.)

ABSTRACT OF REPORT OF COMMISSION OF 1803 ON BOUNDARY BETWEEN MASSACHUSETTS AND CONNECTICUT WEST OF THE CONNECTICUT RIVER.

Beginning at a point on the west bank of Connecticut River, in latitude 42° 01′ 52″.10, longitude 72° 37′ 03″.46, and running north 82° 45′ west 22 chains 25 links; thence north 82° west 95 chains 33 links; thence north 77° 4′ west 138 chains 63 links; thence north 79° 48′ west 102 chains 80 links; thence north 81° 30′ west 61 chains 20 links; thence south 5° west 2 chains; thence north 85° west 167 chains 33 links to a stone monument at the middle pond, 22 links east of low-water mark, latitude 42° 02′ 11″, longitude 72° 45′ 45″.07; thence southerly along the east shore of said pond, and also south pond, to a stone monument at high-water mark, at the south corner of said south pond; thence south 10° 20′ west 24 chains 78 links to a stone monument at southeast corner of Southwick, which is in latitude 42° 00′ 11″.98, longitude 72° 46′ 24″.23; thence south 87° 30′ west 208 chains 22 links to a stone monument at the southwest corner of Southwick, which is in latitude 41° 59′ 51″.89, longitude 72° 49′ 25″.47; thence north 10° 20′ east 212 chains 84 links, to a stone monument at the northwest corner of the Southwick Jog, which is in latitude 42° 02′ 12″.39, longitude 72° 49′ 13″.51; thence north 82° 17′ west 242 chains 40 links to a white oak tree, marked by commissioners in 1717, which is in latitude 42° 02′ 15″.84, longitude 72° 52′ 47″.74; thence north 84° 24′ west 205 chains 50 links; thence north 85° 7′ west 62 chains 15 links; thence north 82° 52′ west 109 chains 35 links to a stone monument in latitude 42° 02′ 17″.03, longitude 72° 58′ 22″.52; thence north 82° 52′ west 275 chains 91 links; thence north 81° 45′ west 70 chains; thence north 81° 50′ west 328 chains 74 links to a stone monument, which is in latitude 42° 02′ 31″.11, longitude 73° 07′ 35″.94; thence north 82° 11′ west 395 chains 50 links; thence north 82° 9′ west 430 chains; thence north 82° 52′ west 140 chains to a stone monument on the road from Salisbury to Sheffield, which is in latitude 42° 02′ 58″.11, longitude 73° 22′ 55″.27; thence north 82° 52′ west 239 chains 39 links; thence north 85° 30′ west 239 chains to the northwest corner of Connecticut, which is in latitude 42° 02′ 58″.54, longitude 73° 30′ 06″.66.

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[5] Boundary stone in west front of Granville.

According to the survey of the cession of Boston Corners, by Massachusetts to New York, in 1855, the south boundary of Massachusetts from the northwest corner of Connecticut to the southwest corner of Massachusetts is as follows, viz:

A line running north 89° 08′ 4″ west, 40 chains, by the true meridian.

The courses of the line of 1803 are magnetic, with the variation as at that date: *i. e.*, 5° west.

The latitudes and longitudes in the foregoing are taken from the Borden Trigonometrical Survey of Massachusetts of 1843.

In 1826, the line between Massachusetts and Connecticut east of the Connecticut River was run by commissioners appointed from each State. An abstract of the commissioners' report is here given:

Abstract of report of commissioners of 1826.—The commissioners first made the following survey: Commencing at the northeast corner of Connecticut, at a large pile of stones erected by commissioners of 1734; thence running due west on the latitude of 42° 3′ north to the west line of Woodstock, 15 miles 169 rods 15 links. (This is hereafter referred to as the "first line of latitude.") Thence north 3° west 54 rods 19 links to an old pine tree, the reputed northeast corner of Union; thence due west 25 miles 168 rods to Connecticut River. (This line is hereinafter referred to as the "second line of latitude," and the second line of latitude is 54 rods north of the first.) These lines of latitude were compared with the ancient survey, monuments, evidence, etc., of the line run by the commissioners of 1713; the said lines of latitude were found to vary in sundry places therefrom. Therefore, in order to conform as near as possible to the line of 1713, the line was run as follows, viz:

Beginning at the northeast corner of Connecticut and running west on "first line of latitude" 1,702 rods and 4 links to the road to the Merino road; thence in a direct line 1,372 rods 20 links to the road leading from Muddy Brook, so called, by Pennel May's to Southbridge; this point is 21 rods 10 links north of the "first line of latitude"; thence in a direct line 360 rods 5 links to the Norwich and Woodstock turnpike (this point is 20 rods and 5 links north of "first line of latitude"); thence in a direct line 954 rods 18 links to the road leading from West Woodstock by Abel Mason's to Southbridge (this point is 10 rods and 22 links north of "first line of latitude"); thence in a direct line 1,247 rods to the road leading from Union by Asher Bodgen's to Holland (this point is 2 rods 14¾ links south of "second line of latitude"); thence in a direct line 1,127 rods to the turnpike from Hertford through Stafford and Holland to Worcester (this point is 6 rods 23½ links south of the "second line of latitude"); thence in a direct line 467 rods to an old white-oak tree, an ancient bound, on the road from Stafford by Robert Andruss' to South Brimfield (this point is 1 rod 2 links south of "second line of latitude"); thence in a direct line of 1,615 rods to the road leading from Stafford by Henry Cady's to Monson (this point is 16 rods 15 links south of "second line of latitude)"; thence in a direct line 256 rods to the Tracy road (this point is 12 rods 12 links south of "second line of latitude)"; thence in a direct line 620 rods to the road leading from Stafford by Seth Sheldon's to South Wilbraham (this point is 14 rods 7 links south of "second line of latitude"); thence in a direct line 1,066 rods to the road from Somer's by Walter Ainsworth's to Springfield (this point is 4 rods 1 link *north* of "second line of latitude"); thence in a direct line 523 rods to the road from Somer's by Abel Peas's to Springfield (this point is 6 rods 12 links south of the "second line of latitude"); thence *due west* 645 rods to the ancient line between Springfield (now Long Meadow) and Enfield; thence *south* 80° 30′ *west* by the true meridian 645 rods to a monument at an old oak stump; thence *south* 51° 30′ *west* by the true meridian 164 rods 18 links to a monument at an old pine stump; thence *due west* 349 rods 15 links to a monument on the Connecticut River 12 rods from the shore; thence due west to Connecticut River. On the line are erected 49 monument stones, marked on the north side M and on the south side C.

The commissioners also surveyed and marked the line from the the corner of Connecticut to the corner of Rhode Island, reporting as follows:

> Beginning at the monument erected at the northeast corner of said State of Connecticut and running in a direct line to the ancient heap of stones on the north side of the turnpike leading from Hertford to Boston through Thompson and Douglass, where we erected a monument, and thence running in a direct line to the northwest corner of the State of Rhode Island.

(For survey of 1826, see Private Laws of Conn., vol. 2, pages 1544 to 1550.)

The boundary between Massachusetts and New York at an early period became a subject of bitter dispute, New York claiming to the west bank of the Connecticut River under the charters of 1664 and 1674 to the Duke of York, Massachusetts claiming under her old charters to the South Sea. After many fruitless attempts at a settlement, an arrangement was entered into in 1773 fixing the western boundary of Massachusetts where it meets New York territory. The Revolution following soon after, the line was not run. In 1785 Congress appointed three commissioners to run the line, who performed that duty in 1787. The line was as follows, viz:

> Beginning at a monument erected in 1731 by commissioners from Connecticut and New York, distant from the Hudson River 20 miles, and running north 15° 12′ 9″, east 50 miles 41 chains and 79 links, to a red or black oak tree marked by said commissioners, which said line was run as the magnetic needle pointed in 1787. (*Vide* Revised Statutes of New York, 1875, p. 122.)

The claims of Massachusetts to western lands were finally settled December 16, 1786, by a joint commission of the two States. By this agreement Massachusetts surrendered the sovereignty of the whole disputed territory to New York, and received in return the right of soil and pre-emption right of Indian purchase west of the meridian passing through the eighty-second mile-stone of the Pennsylvania line, excepting certain reservations upon Niagara River. The title to a tract known as "The Boston Ten Towns," lying east of this meridian, previously granted by Massachusetts, was also confirmed. (*Vide* Hough's N. Y. Gaz., 1872, pp. 25, 26.)

April 19, 1785, Massachusetts executed a deed to the United States. It included all title of the State of Massachusetts to territory west of the present western boundary of New York.

In 1820 Maine, hitherto a part of Massachusetts, was admitted into the Union as an independent State.

In 1853 a small portion of territory in the southwestern corner of Massachusetts, known as Boston Corner, was ceded to New York, and the cession confirmed by Congress in 1855.

The cession of Boston Corner to New York changes the boundary, so that it is now as follows, viz:

Beginning at a monument erected in 1731 by commissioners from Connecticut and New York (known as the Connecticut monument), standing in the south boundary of Massachusetts, latitude 42° 02′ 58″.54, longitude 73° 30′ 06″.66, which is the northwest corner of the State of Connecticut; thence along the south boundary of Massachusetts, north 89° 08′ 41″ west, 40 chains; thence north 12° 57′ 16″ west 207.49^{5} chains to a marble post marked on the east side M. S., on the west side N. Y., and on the south side 1853, which is in the line run by United States commissioners in 1787; thence north 15° 12′ 9″ east on the line run by said United States commissioners ([6]47 miles 73.70^{5} chains) to a red or black oak tree marked by said United States commissioners, in the south boundary of the State of Vermont, latitude 42° 44′

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[6] This distance has been obtained by subtracting the length of the west line of Boston Corner given in survey of 1853 from the entire length of west boundary of Massachusetts as given by the United States commissioners in 1787.

45″.58, longitude 73° 16′ 17″.68. [See Revised Statutes of New York, 1875 page 122; also plat of survey of Boston Corner in 1853, a copy of which i on file in office of clerk of House of Representatives at Washington, D. C.

RHODE ISLAND.

The present State of Rhode Island was settled by Roger William and other immigrants, who left Massachusetts Bay and establishe themselves at Providence in 1636.

In 1643 a patent was granted for the Providence Plantation, fro which the following are extracts, viz:

* * * * * * *

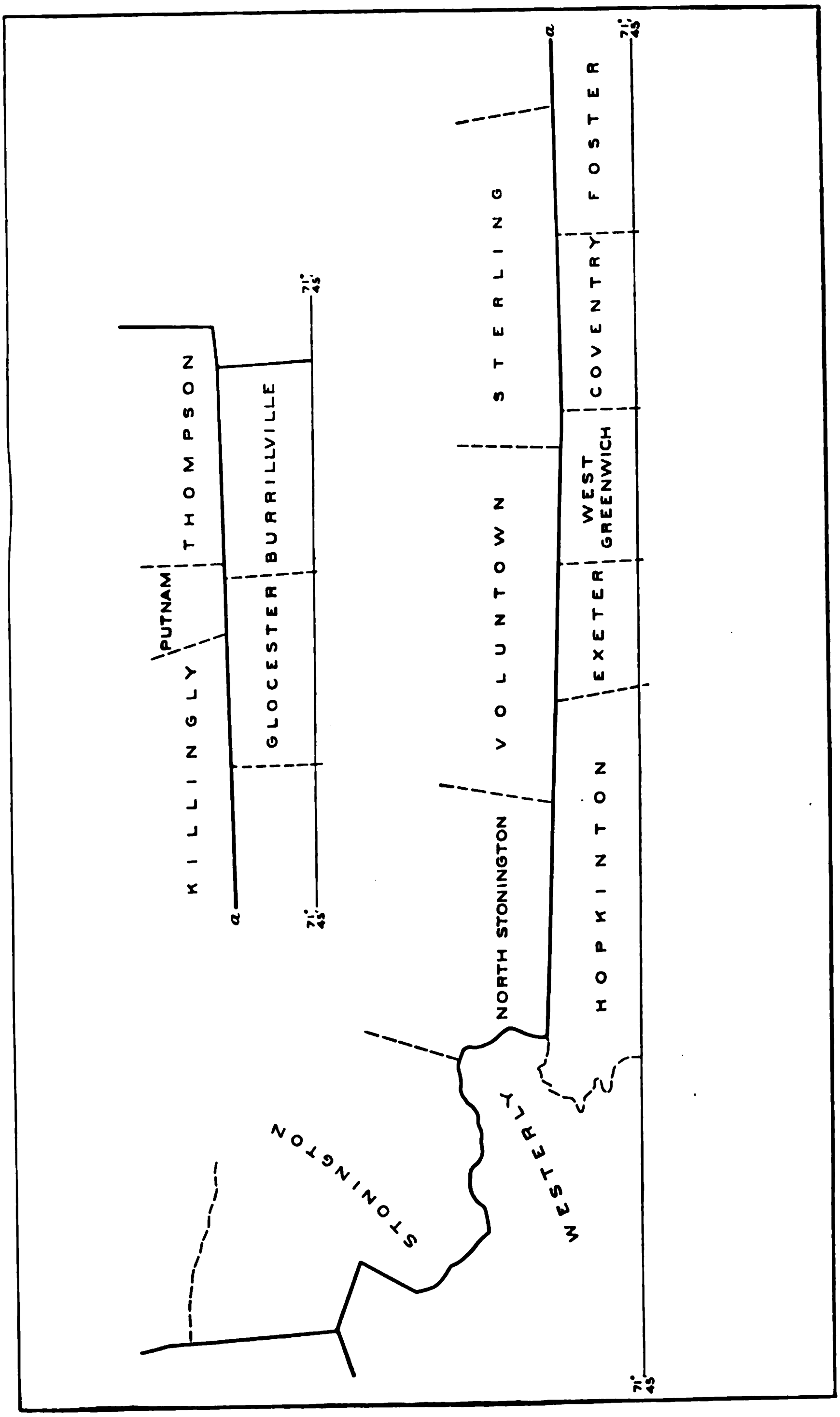
> And wheras there is a tract of land in the continent of America aforesaid, called b the name of the Narraganset Bay, bordering northward and northeast on the patent o the Massachusetts, east and southeast on Plymouth patent, south on the ocean, and o the west and northwest by the Indians called Nariggannencks, alias Narragansets, th whole tract extending about 25 English miles unto the Pequot River and country; an wheras divers English inhabitants of the towns of Providence, Portsmouth, an Newport, in the tract aforesaid, * * * have represented their desire, * * * w * * * do * * * give, grant, and confirm to the aforesaid inhabitants of th towns of Providence, Portsmouth, and Newport a firm and absolute charter of inco poration, to be known by the name of the incorporation of Providence Plantations, i the Narraganset Bay, in New England. * * *

In 1663 Charles II granted a charter to Rhode Island and Providenc Plantations, of which the following is an extract:

> * * * "All that parte of our dominiones in New-England, in America, conteynein the Nahantick and Narragansett Bay, and countryes and partes adjacent, bounded o the west, or westerly, to the middle or channel of a river there, commonly called an known by the name of Pawcatuck, alias Pawcawtuck river, and soe along the say river, as the greater or middle streame thereof reacheth or lyes upp into the nort countrye, northward, unto the head thereof, and from thence, by a streight lyn drawn due north untill itt meets with the south lyne of the Massachusetts Collony and on the north, or northerly, by the aforesayd south or southerly lyne of the Mass chusetts Collony or Plantation, and extending towards the east, or eastwardly, thre English miles to the east and north-east of the most eastern and north-eastern part of the aforesayd Narragansett Bay, as the sayd bay lyeth or extendeth itself from th ocean on the south, or southwardly, unto the mouth of the river which runneth to wards the towne of Providence, and from thence along the eastwardly side or bank of the sayd river (higher called by the name of Seacunck river), up to the ffalls calle Patuckett ffalls, being the most westwardly lyne of Plymouth Collony, and soe fro the sayd ffalls, in a streight lyne, due north, untill itt meet with the aforesayd lin of the Massachusetts Collony; and bounded on the south by the ocean." And in par ticular, the lands belonging to the townes of Providence, Pawtuxet, Worwicke, Nus quammack, alias Pawcatuck, and the rest upon the main land in the tract aforesay together with Rhode Island, Blocke Island, and all the rest of the islands and bank in the Narragansett Bay and bordering upon the coast of the tracts aforesaid (Ffish ers Island only excepted). * * *

(For history of the northern and eastern boundaries see Massa chusetts, p. 54.)

In 1703 substantially the present western boundary was settled b an agreement made between the commissioners from the two colonie of Rhode Island and Connecticut, viz: "A straight line from the mout



BOUNDARY BETWEEN RHODE ISLAND AND CONNECTICUT

of Ashawoga River to the southwest corner of the Warwick purchase, and thence a straight north line to Massachusetts.

The line of 1703 was actually run by Rhode Island, and is still known as the Dexter and Hopkins line.

The two colonies disagreeing, Rhode Island appealed to the King, and the agreement of 1703 was finally established in 1726.

In September, 1728, commissioners from the two colonies met and ran the line.

(For agreement of 1703 and 1728, decisions of English council, etc., see R. I. Hist. Soc. Coll., Vol. III.)

In 1839 commissioners were appointed by Rhode Island and Connecticut to survey and ascertain the line and erect monuments.

The following line was established, viz:

> Beginning at a rock near the mouth of Ashawoga River, where it empties into Pawcatuck River, and from said rock a straight course northerly to an ancient stone heap at the southeast corner of the town of Voluntown, and from said rock southerly in the same course with the aforesaid line, until it strikes Pawcatuck River. From the southeast corner of Voluntown a straight line to a stone heap at the southwest corner of West Greenwich; from thence a straight line to the southwest corner of the ancient town of Warwick, and which is now a corner of the towns of Coventry and West Greenwich; from thence a straight line to the northwest corner of the town of Coventry; thence a straight line to the northeast corner of Sterling; thence a straight line to the southwest corner of Burrillville, and thence a straight line to a stone heap upon a hill in the present jurisdictional line between the States of Massachusetts and Rhode Island, and at all of said corners, excepting said Warwick corner, we have erected monuments of stone, marked R. I. and C., and have also placed similar monuments on all the principal roads crossing the line, and at other suitable places.
>
> * * * * * * *
>
> And we have caused the ancient monument which was erected at the Warwick corner in November, 1742, to be reset and a large heap of stones to be made around it. Said monument is marked with the letter C. on one side, and on the other RHODE. ISLAND and the traces of other letters and figures. [Extract from Commissioner's Report. See R. I. Acts and Resolves, Jan. 1846, pages 12, 13, 14.]

The above was ratified in 1846.

CONNECTICUT.

The title by which the people of Connecticut held the country was founded on the old patent granted by Robert, Earl of Warwick, in 1631, to Lord Say and Seal, Lord Brooke, Sir Richard Saltonstall, and others, associated under the name of the Plymouth Company.

In 1630 the Plymouth Council made a grant of Connecticut to the Earl of Warwick, their president. This was confirmed by King Charles in 1631, and on the 19th of March, in the same year, the Earl conveyed his title to the Plymouth Company, as before stated. (Dwight's Conn., p. 19, *et seq.*)

A charter was granted by Charles II to Connecticut in 1662, of whi the following is an extract, viz:

* * * * * * *

> We * * * do give, grant and confirm unto the said Governor and Company, their successors, all that part of our Dominions in New England in America boun on the east by Narraganset River, commonly called Narraganset Bay, where the river falleth into the sea, and on the north by the line of the Massachusetts plan tion; and on the south by the sea; and longitude as the line of the Massachus Colony, running from east to west, that is to say, from the said Narragansett Bay the east, to the south sea on the west part, with the islands thereunto adjoining.

* * * * * * *

[C. and C., p. 256-7.

Previous to this time the two colonies of Connecticut and New Hav had continued separate, but under this charter they were united a the charter was accepted April 20, 1665. (C. and C., p. 252.)

The Duke of York having been granted a charter in 1664, by whi the lands west of the Connecticut River were embraced in his jurisd tion, the question of boundary immediately arose.

About this time Col. Richard Nichols, George Cartwright, esq., Robert Carr, and Samuel Maverick, esq., had been appointed comm sioners by the King, and clothed with extraordinary powers, to determi all controversies in the colonies. The matter was referred to them, w after a full hearing, determined that the southern boundary of Conne icut was the sea (Long Island Sound), and its western, Mamarone River, and a line drawn north-northwest from the head of salt water it to Massachusetts. The territory south and west of these lines declared to belong to the Duke of York. (*Vide* Dwight's Connectic pp. 159 *et seq.*)

This decision, in effect, decided upon a line 20 miles east of the Hu son River as the boundary, having for a starting point a place on maroneck River.

In 1674 the Duke of York received a new charter in substantially same terms as that of 1664. New controversies concerning jurisdicti led to a new agreement, by which it was stipulated that a tract of la on Long Island Sound, the bounds of which were described as c taining 61,440 acres, should be permanently set off to Connecticut New York on condition that the former, in exchange, should set off New York a territory of like extent and of uniform width from the tr on the Sound to the south line of Massachusetts. This agreement sanctioned by a royal ordinance of the King, and in 1684 the tract the Sound was surveyed and set off to Connecticut.

The western boundary of Connecticut was run in 1685 by Ma Gould, Mr. Barr, and Mr. Selleck, and ratified by both parties. (V Dwight's Connecticut, p. 199.)

For various reasons the survey of the equivalent lands was not ma at that time.

In 1725 commissioners were appointed on both sides to fix the li this being the fifth set appointed for the same purpose, none of which had been able to come to an agreement.

The commissioners of 1725, however, entered into articles of agreement settling the manner of the survey. They, however, ran only the line bounding the tract on Long Island Sound.

For some cause action was then suspended until 1731, when the commissioners of 1725 surveyed and set off the oblong or equivalent territory to New York, defining and marking its boundary, which was to remain forever the dividing line between the respective States (then colonies). The line was substantially as at present, and is as follows, viz:

> Beginning at Lyon's Point, in the mouth of a brook or river called Byram's River, where it falls into Long Island Sound, and running thence up along said river to a rock at the ancient road or wading-place in said river, which rock bears north twelve degrees and forty-five minutes east, five hundred and fifty rods from said point; then north twenty-three degrees and forty-five minutes west, two thousand two hundred and ninety-two rods; then east-northeast, thirteen miles and sixty-four rods, which lines were established in the year one thousand seven hundred and twenty-five, by Francis Harrison, Cadwaller Colden, and Isaac Hicks, commissioners on the part of the then province of New York, and Jonathan Law, Samuel Eells, Roger Walcott, John Copp, and Edmund Lewis, commissioners on the part of the then colony of Connecticut, and were run as the magnetic needle then pointed; then along an east-northeast continuation of the last-mentioned course, one mile, three-quarters of a mile, and twenty-one rods, to a monument erected in the year one thousand seven hundred and thirty-one by Cadwaller Colden, Gilbert Willett, Vincent Matthews, and Jacobus Bruyn, jr., commissioners on the part of said province, and Samuel Eells, Roger Walcott, and Edmund Lewis, commissioners on the part of said colony, which said monument is at the southeast corner of a tract known and distinguished as the oblong or equivalent lands; then north twenty-four degrees and thirty minutes west, until intersected by a line run by said last-mentioned commissioners, on a course south twelve degrees and thirty minutes west, from a monument erected by them in the south bounds of Massachusetts, which monument stands in a valley in the Taghkanick Mountains, one hundred and twenty-one rods eastward from a heap of stones in said bounds, on the top or ridge of the most westerly of said mountains; then north twelve degrees and thirty minutes east from a monument erected by said last-mentioned commissioners at said place of intersection, and standing on the north side of a hill, southeasterly from the easternmost end of the long pond, along the aforesaid line to the aforesaid monument erected in the south bounds of Massachusetts—being the northeast corner of the oblong. (See Revised Statutes of N. Y., 1881, Vol. I, pages 128-9.)

For more than a century no controversy arose, but subsequent to 1850 questions of jurisdiction were raised, and in 1855 Connecticut made a proposition for a new survey. Several sets of commissioners were appointed, but no agreement being reached, finally, in 1860, pursuant to an act of the legislature of New York, the line was run by the New York commissioners, Connecticut not being represented.

The first section of the act of the New York legislature is as follows, viz:

> 1. The commissioners appointed by the governor to ascertain the boundary line between the States of New York and Connecticut are hereby empowered and directed

to survey and mark, with suitable monuments, the said line between the two Stat *as fixed by the survey of* 1731.

The following is an abstract of the engineer's report of the line ru under direction of the commissioners from New York, the Connectic commissioners declining to be present or assist, viz:

Beginning at the northwest corner of Connecticut, at the monume erected by the commissioners of New York and Connecticut in 1731, lat tude 42° 02′ 58″.54, longitude 73° 30′ 06″.66; thence south 11° 20′ wes 464 chains, to the [7]47th mile monument; thence south 12° 34′ west, 23 chains, 57 links, to the 44th mile monument point; thence south 11° 3 west, 160 chains 99 links, to the 42d mile monument; thence south 13 16′ west, 161 chains 24 links, to the 40th mile monument point; thenc south 12° 21′ west, 398 chains 21 links, to the 35th mile monument thence south 12° 32′ west, 158 chains 96 links, to the 33d mile mon ment; thence south 11° 44′ west, 243 chains 37 links, to the 30th mil monument; thence south 12° 27′ west, 161 chains 32 links, to the 28t mile monument; thence south 10° 56′ west, 160 chains, to the 26th mil monument point; thence south 11° 39′ west, 320 chains 11 links, to the 22 mile monument; thence south 12° 18′ west, 163 chains 17 links, to th 20th mile monument; thence south 11° 49′ west, 159 chains 9 links, t the 18th mile monument; thence south 12° 19′ west, 157 chains 15 link to the 16th mile monument; thence south 10° 11′ west, 161 chain 7 links to the 14th mile monument; thence south 10° 51′ west, 313 chain 41 links, to the 10th mile monument point; thence south 12° 24′ wes 155 chains 71 links, to the 8th mile monument; thence south 10° 19′ wes 159 chains 28 links, to the 6th mile monument point; thence south 12 10′ west, 164 chains 42 links, to the 4th mile monument; thence sout 11° 44′ west, 158 chains 99 links, to the 2-mile monument; thence sout 14° 10′ west, 109 chains 41 links, to the Ridgefield angle monument; thence south 25° 8′ east, 213 chains 39 links, to the 4th mile monume on the east line of the oblong between the Wilton and Ridgefield angles thence south 24° 48′ east, 157 chains 63 links, to the 2-mile monument thence south 24° 14′ east, 167 chains 28 links, to the Wilton angle mon ument, or southeast corner of the oblong as set off by the commissio ers of 1731; thence south 67° 45′ west, 138 chains 76 links, to the south west corner of the oblong, and being where the survey of 1725 term nated; thence south 65° 44′ west, 90 chains 87 links, to a point consi ered the original 12th mile monument point; thence south 66° 56′ wes 241 chains 93 links, to a point called the 9th mile monument; thenc south 66° 45′ west, 319 chains 12 links, to the 5th mile monument point thence south 66° 25′ west, 398 chains 40 links, to the angle at the Duke

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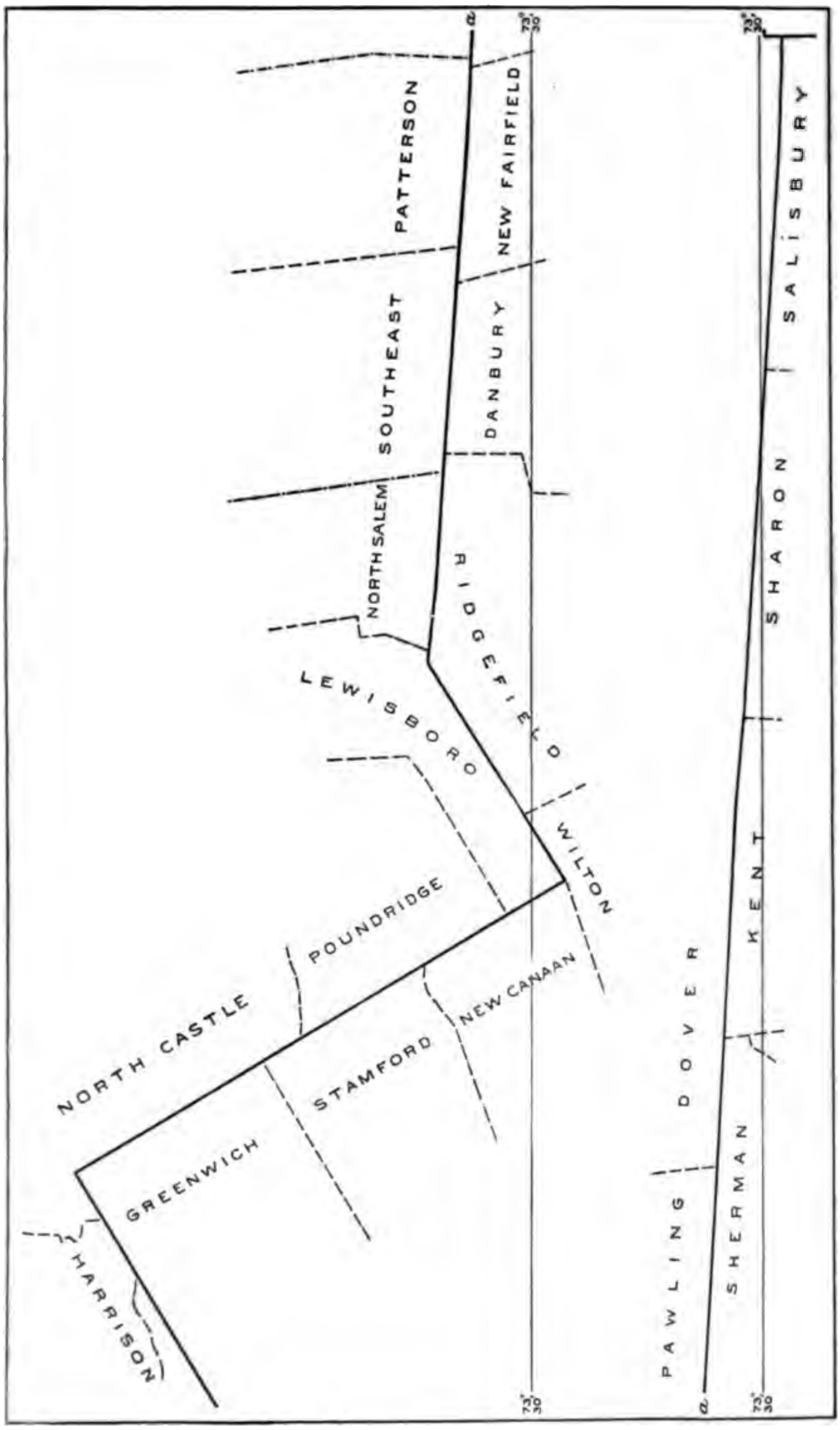
[7] The mile monuments referred to are those, at that time remaining, which we established by the Connecticut and New York commissioners of 1731.

[8] The entire distance from the Massachusetts line to Ridgefield angle is 52 miles rods, a difference of only 5 rods from the survey of 1731.



BOUNDARY BETWEEN CONNECTICUT AND NEW YORK.

Trees; thence south 23° 38′ east, 172 chains 93 links, to a point which is west-southwest and distant 32 rods from the chimney in the old Clapp house; thence south 24° 21′ east, 224 chains 78 links, to a point opposite the old William Anderson house; thence south 24° 19′ east, 173 chains 7 links, to the great stone at the ancient wading place on Byrom River; thence south 17° 45′ west, 12 chains 60 links, to a rock in the river which can be seen at low tide, in which there is a bolt; thence south 27° west, 55 chains 19 links; thence south 7° 20′ east, 13 chains 45 links; thence south 12° 10′ east, 16 chains 13 links; thence south 2° 40′ east, 9 chains 4 links; thence south 28° 25′ east, 9 chains 54 links; thence south 18° 40′ east, 4 chains 77 links; thence south 11° 55′ west, 6 chains 33 links; thence south 58° 10′ west, to where it falls into the sound. (See report of the commissioners to ascertain and settle the boundary line between the States of New York and Connecticut, February 8, 1861, in which will also be found a complete account of this controversy.)

In 1880 commissioners were appointed by Connecticut and New York. Their report was ratified in 1880.

These commissioners reported as follows, viz:

> We agree that the boundary on the land constituting the western boundary of Connecticut and the eastern boundary of New York shall be and is as the same was defined by monuments erected by commissioners appointed by the State of New York, and completed in the year 1860, the said boundary line extending from Byram Point, formerly called Lyon's Point, on the south, to the line of the State of Massachusetts on the north.
>
> And we further agree that the boundary on the sound shall be and is as follows:
>
> Beginning at a point in the center of the channel, about 600 feet south of the extreme rocks of Byram Point, marked No. 0, on appended United States Coast Survey chart; thence running in a true southeast course 3½ statute miles; thence in a straight line (the arc of a great circle) northeasterly to a point 4 statute miles due south of New London Light-House; thence northeasterly to a point marked No. 1, on the annexed United States Coast Survey chart of Fisher's Island Sound, which point is on the longitude east three-quarters north, sailing course down on said map, and is about 1,000 feet northerly from the Hommock or North Dumpling Light-House; thence following said east three-fourths north sailing course as laid down on said map, easterly to a point marked No. 2 on said map; thence southeasterly to a point marked No. 3 on said map; so far as said States are coterminous. (See Revised Statutes of New York, 1881, Vol., I, page 136.)

The above agreement concerning these boundaries between Connecticut and New York was confirmed by the Congress of the United States on February 26, 1881. (See Revised Statutes of United States, 1881.)

(For the history and present location of the eastern boundary of Connecticut, *vide* Massachusetts, p. 61, and Rhode Island, p. 70. For the northern boundary, *vide* Massachusetts, p. 64.)

Under the charter of 1662 Connecticut claimed a large western territory. Subsequent to the Revolution, however, in 1786, 1792, 1795, and 1800, she relinquished all title to any land west of her present boundary.

NEW YORK.

The territory included in the present State of New York was embraced in the French and English grants of 1603 and 1606. The Dutch, however, in 1613 established trading posts on the Hudson River and claimed jurisdiction over the territory between the Connecticut and Delaware Rivers, which they called New Netherlands. The government was vested in "The United New Netherland Company," chartered in 1616, and then in "The Dutch West India Company," chartered in 1621.

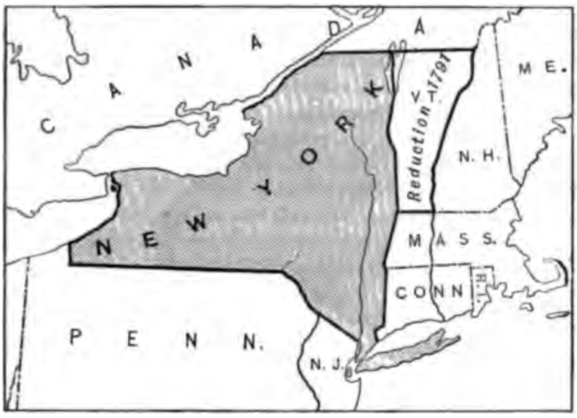
In 1664 King Charles II of England granted to his brother, the Duke of York, a large territory in America, which included, with other lands, all that tract lying between the west bank of the Connecticut River and the east bank of the Delaware. The Duke of York had previously purchased, in 1663, the grant of Long Island and other islands on the New England coast, made in 1635 to the Earl of Stirling, and in 1664, with an armed fleet, he took possession of New Amsterdam, which was thenceforth called New York. This conquest was confirmed by the treaty of Breda, in 1667.

The following is an extract from the grant of 1664 to the Duke of York:

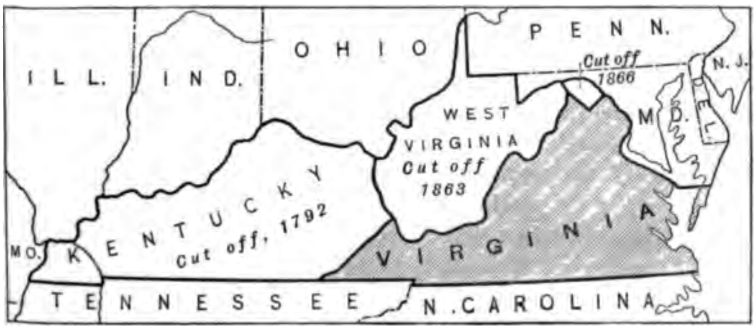
> All that parte of the maine land of New England beginning at a certaine place called or knowne by the name of St. Croix next adjoyning to New Scotland in America and from thence extending along the sea coast unto a certain place called Petuaquine or Pemaquid and so up the River thereof to the further head of ye same as it tendeth northwards and extending from thence to the River Kinebequi and so upwards by the shortest course to the River Canada northward and also all that Island or Islands commonly called by the severall name or names of Matowacks or Long Island scituate lying and being towards the west of Cape Codd and ye narrow Higansetts abutting upon the maine land between the two Rivers there called or knowne by the severall names of Conecticutt and Hudsons River togather also with the said river of Hudsons River and all the land from the west side of Conecticutt to ye east side of Delaware Bay and also all those severall Islands called, or knowne by the names of Martin's Vinyard and Nantukes otherwise Nantuckett togather with all ye lands islands soyles harbours mines minerals quarryes woods marshes waters lake ffishings hawking hunting and ffowling and all other royalltyes proffitts commoditíes and hereditaments to the said severale island lands and premisses belonging and appertaining with theire and every of theire appurtenances and all our estate right title interest benefitt advantage claime and demand of in or to the said lands and premises or any part or parcell thereof and the reversion and reversions remainder and remainders togather with the yearly and other ye rents revenues and proffitts of all and singular the said premisses and of every part and parcell thereof to have and to hold all and singular the said lands islands hereditaments and premisses with their and every of their appurtenances.

In July, 1673, the Dutch recaptured New York and held it until it was restored to the English by the treaty of Westminster, in February 1674.

The Duke of York thereupon, to perfect his title, obtained a new



HISTORICAL DIAGRAM OF NEW YORK.



HISTORICAL DIAGRAM OF VIRGINIA.

grant, in substantially the same terms as that of 1664 (O. and C., p. 1328), of which the following is an extract, viz:

* * * * * * *

> All that part of the main land of New England, beginning at a certain place called or known by the name of Saint Croix nexe adjoining to New Scotland in America, and from thence extending along the sea-coast into a certain place called Petuaquim or Pemquid, and so up the river thereof to the furthest head of the same as it windeth northward and extending from the river of Kinebequ and so upwards by the shortest course to the river Canada northwards; and all that island or islands commonly called by the several name or names of Matowacks or Long Islands, situate and being toward the west of Cape Cod and the narrow Higansuts abutting upon the main land between the two rivers there called or known by the several names of Connecticut and Hudson Rivers, together also with the said river called Hudson's River, and all the lands from the west side of Connecticut River to the east side of Delaware Bay; and also all those several islands called or known by the names of Martin Vinyard and Nantukes, otherwise Nantuckett.

* * * * * * *

By these grants to the Duke of York and the conquest of the Dutch possessions in America, it will be seen that New York originally had a claim to a much larger territory than is now included in her limits. The successive changes in her extent may be sketched as follows, viz:

In 1664 the Duke of York sold the present State of New Jersey to Lord John Berkeley and Sir George Carteret.

In 1682 the Duke of York sold to William Penn his title to Delaware and the country on the west bank of the Delaware, which had been originally settled by the Swedes, then conquered by the Dutch, and which had by them been surrendered to the Duke of York.

In 1686 Pemaquid and its dependencies were annexed to the New England government by a royal order, the Duke of York having acceded to the throne of England.

By the charter of 1691 to Massachusetts Bay, all claim to any part of Maine was extinguished, and the islands of Nantucket, Marthas Vineyard, and others adjacent (hitherto known as Duke's County, New York), were annexed to Massachusetts Bay.

The territory west of the Connecticut River to within about 20 miles of the Hudson River, now forming a portion of Massachusetts and Connecticut, were, by agreements and concessions made at various periods, surrendered to those States respectively.

In 1781 New York released to the General Government all the lands to which she had claim west of a meridian extending through the west extremity of Lake Ontario, and in 1790 she gave up all claim to the present State of Vermont and consented to her independence.

By these successive reductions New York was left with substantially her present boundaries.

(For the history and settlement of the eastern boundary of New York, vide Vermont, Massachusetts, and Connecticut, *ante* pp. 52, 68, and 72.)

The northern boundary was settled by the treaty of peace in 1783 and by the commission under the sixth article of the treaty of Ghent. (*Vide* p. 13.)

The boundary between New York and New Jersey was plainly stated in the grant by the Duke of York to Berkeley and Carteret. (*Vide* New Jersey, p. 82.)

In 1719 attempts were made to have the line run and marked, but nothing seems to have been done to settle the matter permanently till 1769, when commissioners were appointed by the King, who fixed on substantially the present line. (*Vide* R. S. N. J., 1821, pp. 29–34.)

In 1772 this line was confirmed by the legislatures of both colonies, and commissioners were appointed to survey and mark the same.

This line was as follows, viz:

A direct and straight line from the fork or branch formed by the junction of the stream or waters called the Machackamack with the river Delaware or Fishkill, in the latitude of 41° 21′ 37″, to a rock on the west side of the Hudson River, marked by the said surveyors in the latitude of 41°—said rock was ordered to be marked—with the following words and figures, viz: "Latitude 41° north;" and on the south side thereof "New Jersey"; and on the north side thereof "New York"; also, to mark every tree that stood on the line with five notches and a blaze on the northwest and southeast sides thereof, and to put up stone monuments, at 1 mile distance from each other, along the said line, and to number such monuments with the number of miles; the same shall be from the before-mentioned marked rock on the west side of Hudson's River, and mark the words "New Jersey" on the south side, and the words "New York" on the north side, of every of the said monuments. (See R. S. of N. J., 1821, pp. 29–34.)

The above was confirmed by the king in council September 1, 1773.

In the year 1833 commissioners were appointed by New York and New Jersey for the settlement of the territorial limits and jurisdiction of the two States.

In the following year the commissioners made the following agreement, which was ratified by each State and confirmed by Congress, viz:

UNITED STATES STATUTES AT LARGE. TWENTY-THIRD CONGRESS, SESSION I. 1834.

AN ACT giving the consent of Congress to an agreement or compact entered into between the State of New York and the State of New Jersey, respecting the territorial limits and jurisdiction of said States.

ARTICLE FIRST. The boundary line between the two States of New York and New Jersey, from a point in the middle of Hudson River, opposite the point on the west shore thereof, in the forty-first degree of north latitude, as heretofore ascertained, and marked, to the main sea, shall be the middle of the said river, of the bay of New York, of the waters between Staten Island and New Jersey and of Raritan Bay, to the main sea; except as hereinafter otherwise particularly mentioned.

ARTICLE SECOND. The State of New York shall retain its present jurisdiction of and over Bedloe's and Ellis's Islands, and shall also retain exclusive jurisdiction of and over the other islands lying in the waters above mentioned and now under the jurisdiction of that State.

ARTICLE THIRD. The State of New York shall have and enjoy exclusive jurisdiction of and over all the waters of Hudson River lying west of Manhattan Island and to the south of the mouth of Spuytenduyvel Creek; and of and over the lands covered by the said waters to the low-water mark on the westerly or New Jersey side thereof; subject to the following rights of property and of jurisdiction of the State of New Jersey, that is to say:

1. The State of New Jersey shall have the exclusive right of property in and to the land under water lying west of the middle of the bar of New York, and west of the middle of that part of the Hudson River which lies between Manhattan Island and New Jersey.

2. The State of New Jersey shall have the exclusive jurisdiction of and over the wharves, docks, and improvements made and to be made on the shore of the said State; and of and over all vessels aground on said shore, or fastened to any such wharf or dock, except that the said vessels shall be subject to the quarantine or health laws, and laws in relation to passengers, of the State of New York, which now exist or which may hereafter be passed.

3. The State of New Jersey shall have the exclusive right of regulating the fisheries on the westerly side of the middle of said waters: *Provided*, That the navigation be not obstructed or hindered.

ARTICLE FOURTH. The State of New York shall have exclusive jurisdiction of and over the waters of the Kill Von Kull between Staten Island and New Jersey to the westernmost end off Shorter's Island in respect to such quarantine laws, and laws relating to passengers, as now exist or may hereafter be passed under the authority of that State, and for executing the same; and the said State shall also have exclusive jurisdiction, for the like purposes, of and over the waters of the sound from the westernmost end of Shorter's Island to Woodbridge Creek, as to all vessels bound to any port in the said State of New York.

ARTICLE FIFTH. The State of New Jersey shall have and enjoy exclusive jurisdiction of and over all the waters of the sound between Staten Island and New Jersey lying south of Woodbridge Creek, and of and over all the waters of Raritan Bay lying westward of a line drawn from the light-house at Prince's Bay to the mouth of Mattavan Creek; subject to the following rights of property and of jurisdiction of the State of New York, that is to say:

1. The State of New York shall have the exclusive right of property in and to the land under water lying between the middle of the said waters and Staten Island.

2. The State of New York shall have the exclusive jurisdiction of and over the wharves, docks, and improvements made and to be made on the shore of Staten Island, and of and over all vessels aground on said shore, or fastened to any such wharf or dock; except that the said vessels shall be subject to the quarantine of health laws, and laws in relation to passengers of the State of New Jersey which now exist or which may hereafter be passed.

3. The State of New York shall have the exclusive right of regulating the fisheries between the shore of Staten Island and the middle of said waters: *Provided*, That the navigation of the said waters be not obstructed or hindered.

* * * * * * * *

In 1876 commissioners were appointed to re-locate the land boundary between New York and New Jersey, and replace monuments that may have become dilapidated or removed, or to erect new ones, etc. (*Vide* Rev. of N. J., 1877.)

The above commissioners found in some cases a slight discrepancy between the original marks and the verbal description thereof, and the legislatures of each State ordered that the original monuments should be considered the true boundary. (*See* acts of New York, 1880, and acts of New Jersey, 1881.)

In 1881 a joint commission of the two States was appointed for the purpose of retracing and remarking, in a permanent manner, this boundary. This work was completed in a thorough manner in 1883.

In 1887 a joint commission of the two States was appointed to determine and mark the boundary between the two States, through Raritan Bay. This commission came to an agreement, the terms of which are as follows:

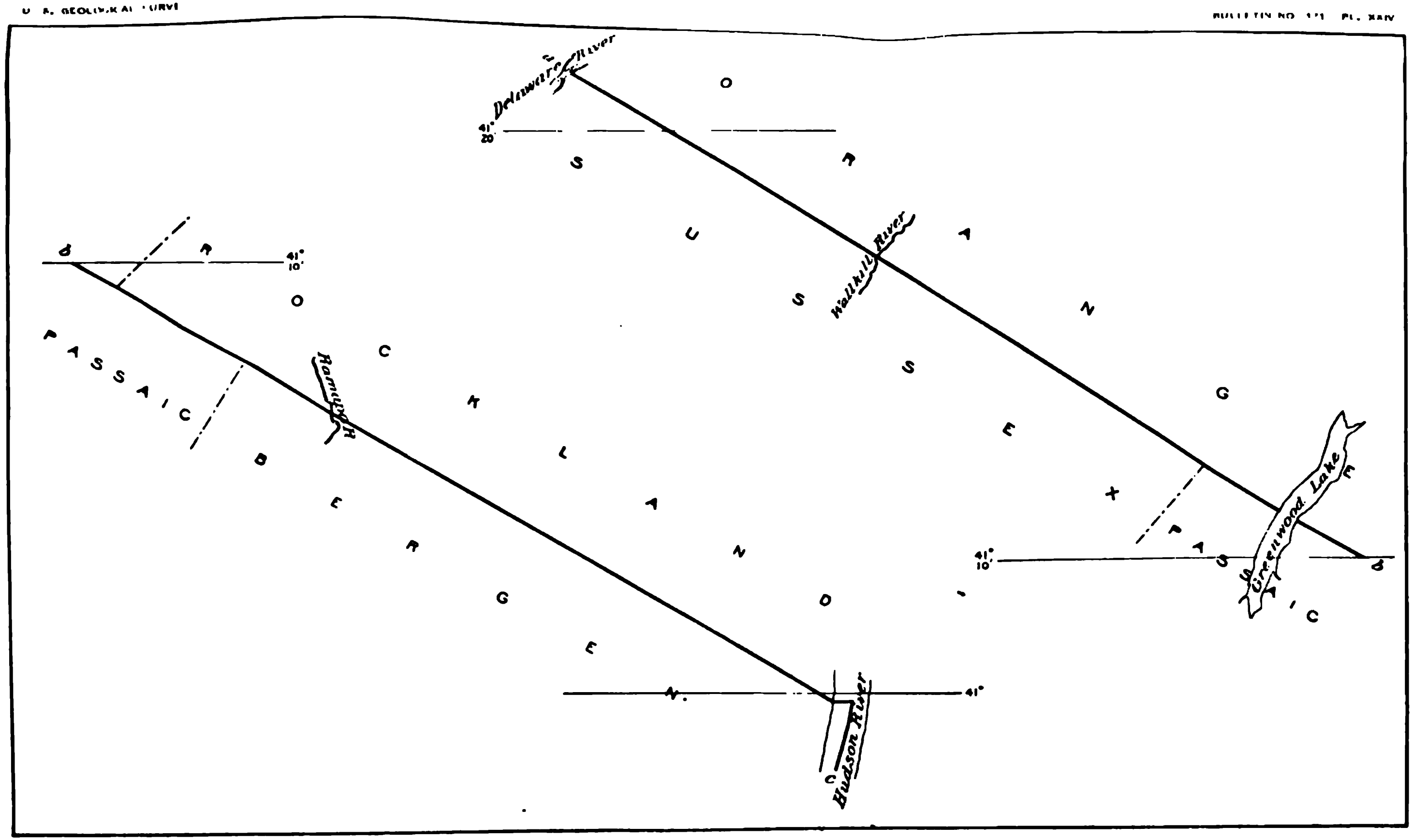
First. From "Great Beds light-house," in Raritan Bay, north, twenty degrees sixteen minutes west, true, to a point in the middle of the waters of Arthur Kill, or Staten Island Sound, equidistant between the southwesterly corner of the dwelling house of David C. Butler, at Ward's Point, on Staten Island, in the State of New York, at the southeasterly corner of the brick building on the lands of Cortlandt L. Parker, at the intersection of the westerly line of Water street with the northerly line of Lewis street, in Perth Amboy, in the State of New Jersey.

Second. From "Great Beds light-house" south, sixty-four degrees and twenty-one minutes east, true (S. 64° 21′ E.), in line with the center of Waackaack or Wilson's beacon, in Monmouth County, New Jersey, to a point at the intersection of said line with a line connecting "Morgan No. 2" triangulation point, U. S. Coast and Geodetic Survey, in Middlesex County, New Jersey, with the "Granite and Iron beacon," marked on the accompanying maps as "Romer stone beacon," situated on the "Dry Romer shoal;" and thence on a line bearing north, seventy-seven degrees and nine minutes east, true (N. 77° 9′ E.), connecting "Morgan No. 2" triangulation point, U. S. Coast and Geodetic Survey, in Middlesex County, New Jersey, with said "Romer stone beacon" (the line passing through said beacon and continuing in the same direction), to a point at its intersection with a line drawn between the "Hook beacon," on Sandy Hook, New Jersey, and the triangulation point of the U. S. Geodetic Survey, known as the Oriental Hotel, on Coney Island, New York; then southeasterly, at right angles with the last mentioned line to the main sea.

Third. The monumental marks by which said boundary line shall be hereafter known and recognized are hereby declared to be as follows:

1. The "Great Beds light-house."
2. A permanent monument marked "State boundary line New York and New Jersey," and to be placed at the intersection of the line drawn from the "Great Beds light-house" to "Waackaack or Wilson's beacon," Monmouth County, New Jersey, and the line drawn from "Morgan No. 2" triangulation point, U. S. Coast and Geodetic Survey, in Middlesex County, New Jersey, to "Romer stone beacon."
3. Eight buoys or spindles, to be marked like the permanent monument above mentioned, and placed at suitable intervening points along the line from the said permanent monument to the "Romer stone beacon."
4. The "Romer stone beacon."

In the year 1774 commissions were appointed by New York and Pennsylvania to fix the beginning of the forty-third degree of north latitude



NORTHEAST BOUNDARY OF NEW JERSEY.

on the Mohawk or western branch of Delaware River, which is the northeast corner of Pennsylvania, and to proceed westward and fix the line between Pennsylvania and New York.

These commissioners reported in December of the same year that they fixed the said northeast corner of Pennsylvania, and marked it as follows, viz:

> On a small island in the said river they planted a stone marked with the letters and figures, New York, 1774, cut on the north side thereof; and the letters and figures, latitude 42° variation 4° 20′, cut on the top thereof; and in a direction due west from thence on the west side of the said branch of Delaware, collected and placed a heap of stones at the water mark; and proceeding further west four perches, planted another stone in the said line marked with the letters and figures, Pennsylvania, 1774, cut on the south side thereof, and the letters and figures, latitude 42° variation 4° 20′, cut on the top thereof, and at the distance of eighteen perches due west from the last-mentioned stone marked an ash tree. The rigor of the season prevented them running the line farther.

Nothing further seems to have been done until 1786–'7, when commissioners were appointed to finish the work thus begun (*see* Cary & Biorden's Laws of Pennsylvania, Vol. III, page 392), and the lines were run and monuments erected. The line was ratified in 1789, and is as follows, viz:

> Beginning at a point in Lake Erie, where the boundary line between the United States and Great Britain is intersected by a meridian line drawn through the most westerly bent or inclination of Lake Ontario; then south along said meridian line to a monument in the beginning of the forty-third degree of north latitude, erected in the year one thousand seven hundred and eighty-seven, by Abraham Herdenbergh and William W. Morris, commissioners on the part of this State, and Andrew Ellicott and Andrew Porter, commissioners on the part of the State of Pennsylvania, for the purpose of marking the termination of the line of jurisdiction between this State and the said State of Pennsylvania; then east along the line established and marked by said last-mentioned commissioners to the ninetieth mile-stone in the same parallel of latitude, erected in the year one thousand seven hundred and eighty-six, by James Clinton and Simeon DeWitt, commissioners on the part of this State, and Andrew Ellicott, commissioner on the part of Pennsylvania; which said ninetieth mile-stone stands on the western side of the south branch of the Tioga River; then east along the line established and marked by said last-mentioned commissioners, to a stone erected in the year one thousand seven hundred and seventy-four, on a small island in the Delaware River, by Samuel Holland and David Rittenhouse, commissioners on the part of the colonies of Pennsylvania and New York, for the purpose of marking the beginning of the forty-third degree of north latitude; then down along said Delaware River to a point opposite to the fork or branch formed by the junction of the stream called Mahackamack with the said Delaware River, in the latitude of forty-one degrees, twenty-one minutes and thirty-seven seconds north; then in a straight line to the termination on the east bank of the Delaware River of a line run in the year one thousand seven hundred and seventy-four, by William Wickham and Samuel Gale, commissioners on the part of the then colony of New York, and John Stevens and Walter Rutherford, commissioners on the part of the then colony of New Jersey. (*See* Revised Statutes of New York, 1881.)

The meridian line forming the western boundary of New York was surveyed and mapped in 1790 by Andrew Ellicott, as United States commissioner (Pa. Archives, Vol. XII—Map), and the latitude formerly inscribed on the monument on Lake Erie, fixing the western boundary, was 42° 16′ 13″. The report of the commissioner has not been found.

In 1865 Dr. Peters, director of Hamilton College Observatory, under the directions of the Regents of the University of New York, determined the latitude and longitude of the boundary monument aforesaid, with the following result: Latitude, 42° 16′ 2″.8; longitude, 79° 45′ 54″.4. (*Vide* Dr. Peters' Report, 1868.)

In 1877 the parallel of the forty-second degree north latitude was ascertained at four points, by the New York and Pennsylvania Joint Boundary Commission, with the following result, viz:

1. At Travis Station (Hale's Eddy), very near the east end of that part of the New York and Pennsylvania line supposed to be on the forty second parallel, the old line was found to be 275 feet north of the parallel.
2. At Finn's Station, about 20 miles from east end (Great Bend), the line is 350 feet south of the parallel.
3. At Burt's Station, about 70 miles from east end (Wellsburg), the line is 760 feet north of the parallel.
4. At Clark's Station, about 253 miles from east end (Wattsburg), the line is 150 feet north of the parallel.

(See pamphlet, Report of Penn. Board of the Penn. & N. Y. Joint Boundary Comm.)

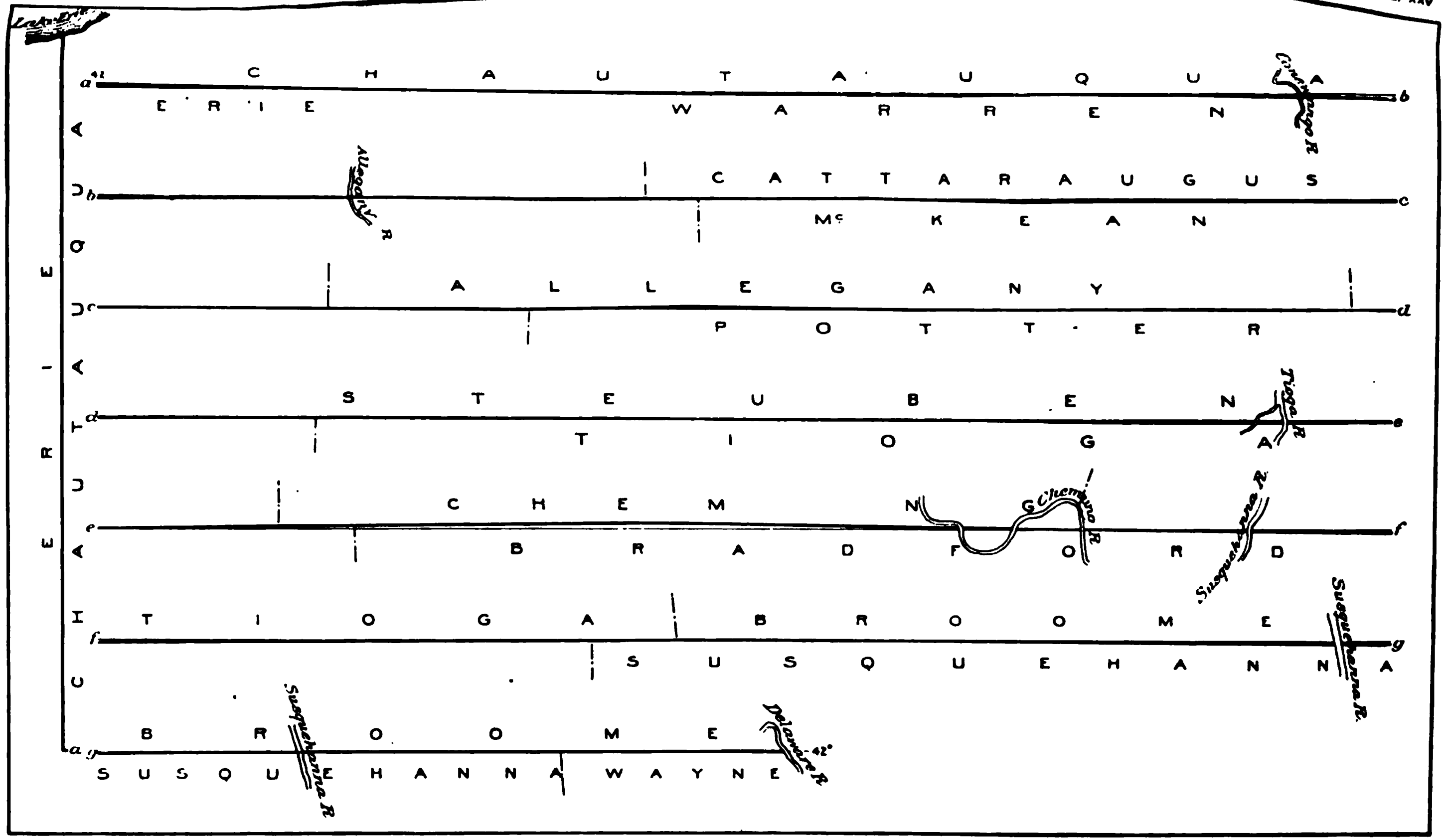
NEW JERSEY.

Although the original grants from the French and English sovereigns of 1603 and 1606 covered the territory forming the present State of New Jersey, the grant which first directly relates to New Jersey is that given in 1664 by the Duke of York to Lord John Berkeley and Sir George Carteret, two months before the setting out of his expedition to take possession of New York.

The following extract from that grant defines the boundaries, viz:

> All that tract of land adjacent to New England, and lying and being to the westward of Long Island and Manhitas Island, and bounded on the east part by the main sea and part by Hudson's River, and hath upon the west Delaware Bay or river, and extendeth southward to the main ocean as far as Cape May, at the mouth of Delaware Bay, and to the northward as far as the northernmost branch of the said bay or river of Delaware, which is forty-one degrees and forty minutes of latitude, and crosseth over thence in a strait line to Hudson's River in forty-one degrees of latitude; which said tract of land is hereafter to be called by the name or names of New Ceaserea or New Jersey. (*Vide* Grants, Concessions, etc., of New Jersey, Leaming & Spicer, p. 8.)

In March, 1673, Lord Berkeley sold his undivided moiety of New Jersey to John Fenwick, by whom, in the following year, it was again sold. July 1, 1676, was executed the famous "Quintipartite deed," by which



WESTERN AND SOUTHERN BOUNDARY OF NEW YORK.

the eastern part was given to Sir George Carteret, to be called East New Jersey, and the western part to the other proprietors, to be called West New Jersey. Sir George Carteret, at his death in 1678, left his land to be sold. It was sold in 1682 to the twelve proprietors, who admitted other partners.

Confirmation grants were made to the proprietors of both provinces by the Duke of York, and confirmed by the King, but between 1697 and 1701 the proprietors repeatedly made petitions to be allowed to surrender their right of government to the Crown. Accordingly, in 1702, the surrender was made and accepted by the Queen, and both parts united were made the province of New Jersey. (*Vide* Leaming and Spicer's grants, etc.)

(For the history of the northern and eastern boundary, *vide* New York, p. 78.)

The grant from the Duke of York to Berkeley and Carteret defined the west boundary of New Jersey to be the Delaware River. (*Vide* p. 82.)

The line between New Jersey and Delaware is thus described in the Revised Statutes of Delaware, p. 2, viz:

> Low-water mark on the eastern side of the river Delaware, within the twelve-mile circle from New Castle and the middle of the bay, below said circle.

In 1876 the legislature of New Jersey authorized the governor to commence a suit in the Supreme Court of the United States to settle the boundary between New Jersey and Delaware. New Jersey claimed jurisdiction to the middle of the Delaware, so far as the river and bay is a boundary between the two States. (*Vide* Revision of New Jersey, p. 1185.)

In 1783 Commissioners were appointed by New Jersey and Pennsylvania to settle the jurisdiction of the river Delaware and the islands within the same. Their report was ratified, and is in substance as follows:

First. It is declared that the river Delaware from the station point or northwest corner of New Jersey, northerly to the place upon the said river where the circular boundary of the State of Delaware touches upon the same, in the whole length and breadth thereof, is and shall continue to be and remain a common highway, equally free and open for the use, benefit, and advantage of the said contracting parties, etc.

Second. That each State shall enjoy and exercise a concurrent jurisdiction within and upon the water, and not upon the dry land between the shores of said river, etc.

Third. That all islets, islands, and dry land within the bed and between the shores of said river, and between said station point northerly and the falls of Trenton southerly, shall, as to jurisdiction, be hereafter deemed and considered as parts and parcels of the State to which such insulated dry land doth lie nearest at the time of making this agreement, and that from said falls of Trenton to the State of Delawa southerly, certain islands (in the agreement they are named B) be a nexed to each State respectively. (*Vide* Revision of New Jersey, 1181.)

In 1786 commissioners were appointed by New Jersey and Penns vania for more accurately determining and describing the islands me tioned in the foregoing agreement; that is, those in the Delaware fr the northwest corner of New Jersey down to the falls of Trenton. Th report was ratified, and a long list of islands, described by name in t act, were annexed to each State respectively. (*Vide* Revision of N Jersey, pp. 1182–'3.)

PENNSYLVANIA.

The Swedish West India Company, chartered by the King of Sw den in 1625, established the first permanent settlement on the west ba of the Delaware, occupying a part of the territory now in Pennsylvar and Delaware, although the Dutch had previously established tradi posts, which had been destroyed by the Indians. The Swedes acquire by successive purchases from the Indian chiefs, all the land extendi from Cape Henlopen to the great falls of the Delaware, calling it N Sweden. (*Vide* O. and C., p. 1509.)

In 1655 this territory was surrendered to the Dutch. (*Vide* Hazar Annals of Pennsylvania, p. 185.)

By the conquest of the New Netherlands, in 1664, the Duke of Yo seems to have successfully claimed the settlements on the west bank the Delaware as a part of his dominions.

In 1681 Charles II of England granted to William Penn the Provin of Pennsylvania. The following extract from the charter defines t boundaries:

> * * * all that Tracte or Parte of Land in America, with all the Islands ther conteyned, as the same is bounded on the East by Delaware River, from twelve mi distance Northwards of New Castle Towne unto the three and fortieth degree of Nor erne Latitude, if the said River doeth extende so farre northwards; But if the s River shall not extend soe farre Northward, then by the said River soe farr as it d extend; and from the head of the said River the Eastern Bounds are to bee determin by a Meridian Line, to bee drawne from the head of the said River, unto the said th and fortieth degree. The said Lands to extend westwards five degrees in longitude, bee computed from the said Easterne Bounds; and the said Lands to bee bounded the North by the beginning of the three and fortieth degree of Northern Latitude, a on the South by a Circle drawne at twelve miles distance from New Castle Northw and Westward unto the beginning of the fortieth degree of Northern Latitude, a thence by a streight Line Westward to the Limit of Longitude above mentioned.

William Penn, in order to perfect his title, procured of the Duke York a deed bearing date August 21, 1682, by which the Duke of Yo conveyed to him all title and claim which he might have to the provin of Pennsylvania. (*Vide* Hazard's Annals of Pa., 586 *et seq.*)

He also purchased of the Duke of York the territory now comprising the State of Delaware, which he held until 1701–'2, when he granted a charter which enabled them to set up a separate government, though still under proprietary control. (*Vide* C. and C., p. 270 *et seq.*)

[For a history of the northern and eastern boundaries of Pennsylvania, see New York and New Jersey, pp. 80 and 83.]

That part of the southern boundary of Pennsylvania between Pennsylvania and Delaware is an arc of a circle, having for its center the steeple of the old court-house at New Castle, Del., and a radius of 12 miles. This was surveyed and marked under a warrant from William Penn in 1701. (*Vide* Hazard's Annals of Pennsylvania.)

This circular line, in connection with adjacent lines, was made the subject of controversy for many years.

According to the original grants of Pennsylvania and Maryland the boundary between them was to be the fortieth degree of north latitude.

This line being found to pass north of Philadelphia and to exclude Pennsylvania from Delaware Bay, negotiations ensued between the proprietors to rectify this geographical blunder, and for nearly a century the matter remained unsettled.

In the year 1732 an agreement was made to fix the boundary. Commissioners were appointed in that year, and subsequently in 1739, to run the line, but they failed to agree, and chancery suits were the result. Taking a decision of Lord Chancellor Hardwick in 1750 as a basis of final adjudication, an agreement was signed July 4, 1760. By this agreement the line between Pennsylvania and Delaware on the one part and Maryland on the other was determined as follows, viz:

> A due east and west line should be run across the peninsula from Cape Henlopen to the Chesapeake Bay. From the exact middle of this line should be drawn a line tangent to the western periphery of a circle, having a radius of 12 English statute miles, measured horizontally from the center of the town of New Castle. From the tangent point a line should be drawn due north until it cut a parallel of latitude 15 miles due south of the most southern part of the city of Philadelphia, this point of intersection to be the northeast corner of Maryland; thence the line should run due west on said parallel as far as it formed a boundary between the two governments. (*Vide* Delaware, p. 87.)

In 1760 commissioners and surveyors were appointed, who spent three years in measuring the base line and the tangent line between Maryland and Delaware.

The proprietors then, wearied with the delay, sent over from England two famous mathematicians, Charles Dixon and Jeremiah Mason, who verified the work of their predecessors, and ran the line west between Pennsylvania and Maryland, since known as "Mason and Dixon's line."

Mason and Dixon fixed the latitude of this line at 39° 43′ 18″. A resurvey in 1850 by Colonel Graham determined it to be 39° 43′ 26″.3.

Mason and Dixon begun their work in 1763, and were stopped by Indians in 1767, having run the line about 244 miles west of the Delaware, not quite finishing their work. They put up mile stones all along said line, every fifth one being marked with the arms of the respective proprietors.

In consequence of the accidental removal of the stone at the northeast corner of Maryland, commissioners were appointed in 1850 by Pennsylvania, Delaware, and Maryland to revise the former survey, which was done by Lieutenant-Colonel Graham, of the United States topographical engineers. The result confirmed the work of Mason and Dixon, and Maryland gained by the resurvey a little less than two acres.

(For a full report of the running of Mason and Dixon's line in 1763-'67, and the verification by Colonel Graham in 1850, see Senate Journal of Delaware for 1851, pages 56-109.)

In 1784 the report of the commissioners who had been appointed to fix the boundaries between Virginia and Pennsylvania (West Virginia then forming part of Virginia) was confirmed, and the lines so fixed are as follows, viz:

> The line commonly called Mason and Dixon's line to be extended due west five degrees of longitude from the river Delaware, for the southern boundary of Pennsylvania, and a meridian drawn from the western extremity thereof to the northern limits of the said States, respectively, be the western boundary of Pennsylvania. (*Vide* C. and B. laws of Pennsylvania, Vol. II, p. 495, and Hening's Virginia, Vol. XI, p. 554.)

By the cession of 1784, by Virginia to the United States—and that of 1800, by Connecticut to the United States, and the formation of the State of West Virginia from a portion of Virginia in 1862—the above-mentioned meridian line becomes the boundary between Pennsylvania on the east, and Ohio and West Virginia on the west.

By an examination of the cession of 1781, by New York to the United States, it will be seen that a small triangular tract on Lake Erie was left in the hands of the General Government. This was sold to Pennsylvania in 1792.

DELAWARE.

The State of Delaware was originally settled by the Swedes. (*Vide* Pennsylvania, p. 84.) In 1655 it was surrendered to the Dutch, who, in 1664, in turn surrendered it to the English, and it was taken possession of by the Duke of York.

William Penn, having received in 1682 a grant of the province of Pennsylvania, bought of the Duke of York the territory comprising the present State of Delaware It was conveyed to him by two deeds of feoffment, dated August 24, 1682, one conveying the town of New Castle and a twelve-mile circle around the same, and the other conveying all the lands south of said circle to Cape Henlopen. (See Hazard's Annals of Pennsylvania, p. 588, *et seq.*)

Soon after the grant made by the royal charter aforesaid, an assembly of the province and three lower counties (then called the territories) was called by the proprietary and governor aforesaid, which met at Chester on the seventh day of December, 1682, when the following laws, among others, were passed, to wit:

> * * * Since * * * it has pleased King Charles the Second * * * to grant * * * William Penn, esq., * * * this Province of Pennsylvania * * * And * James Duke of York and Albany * * * to release his right and claim * * * to the Province of Pennsylvania * * * and * * * to grant unto the said William Penn * * * all that tract of land from twelve miles northward of New Castle, on the river Delaware, down to the South Cape (commonly called Cape Henlopen, and by the Proprietary and Governor now called Cape Jomus) lying on the west side of the said river and bay, * * * lately cast into three counties, called New Castle, Jones, and Whorekills (alias New Dale. * * * Be it enacted * * that the counties of New Castle, Jones, and Whorekills alias New Dale * * * are annexed to the Province of Pennsylvania. * * * (Dallas' Laws of Pennsylvania, 1797, Vol. I, Appendix, p. 24, *et seq*).

In 1701 William Penn granted a charter, under which the province of Pennsylvania and the territories (as Delaware was then called) were made separate governments, though both were still under the proprietary government of William Penn. (C. & C., p. 270.)

By the Revolution the "territories" became the State of Delaware, with substantially her present boundaries.

(For a history of the boundaries between Delaware and Pennsylvania, *vide* Pennsylvania, p. 85, and between Delaware and New Jersey, *vide* New Jersey, p. 83, *et seq.*)

From 1732 to 1769 there was a controversy between the proprietors of Pennsylvania and Maryland in regard to boundaries (*vide* p. 85). The boundaries of Delaware on the north and west—Delaware then being under the jurisdiction of Pennsylvania—were determined as follows, viz:

Beginning at Cape Henlopen and running due west 34 miles 309 perches; thence in a straight line 81 miles 78 chains and 30 links up the peninsula until it touches and makes a tangent to the western periphery of a circle, drawn at the horizontal distance of twelve English statute miles from the center of the town of New Castle.

From this tangent point a line was run due north till it cut a parallel of latitude 15 miles due south of the most southern part of the city of Philadelphia. This point of intersection is the northeast corner of Maryland. The tangent line bearing a little west of north, the due north line from the tangent point cuts off an arc of the 12-mile circle. The boundary line follows the arc of the circle from the tangent point around to the point where the due north line intersects the 12-mile circle, then follows said due north line to said northeast corner of Maryland. The length of said due north line is 5 miles 1 chain and 50 links as given by Mason and Dixon. (*Vide* Jour. Del. Sen., 1851, p. 56 *et seq.*

By the agreement of 1760, based on the decree of Chancellor Hardwick, a due east and west line should be run across the peninsula from Cape Henlopen to Chesapeake Bay, etc. The decree of Lord Hardwick says, touching the position of Cape Henlopen, "that Cape Henlopen ought to be deemed and taken to be situated at the place where the same is laid down and described in the map or plan annexed to the said articles to be situated, and therefore his lordship doth further order and decree that the said articles be carried into execution accordingly," etc.

In Hazard's Annals of Pennsylvania, p. 5, is found the following, viz: "The cape now called Henlopen was then called Cornelia."

William Penn directed that Cape Henlopen be called Cape James (*Vide* Hazard's Pennnsylvania, p. 606; also *vide* Act of union of the territories to Pennsylvania.)

The foregoing statements explain the seeming incongruity between the base line across the peninsula and the position of Cape Henlopen as laid down on all modern maps.

MARYLAND.

The territory comprising the present area of Maryland was included in the previous charters of Virginia, notwithstanding which, in the year 1632, Lord Baltimore received a royal grant of the province of Maryland, whose boundaries are defined in the following extract:

> All that part of the Peninsula or Chersonese, lying in parts of America, between the ocean on the east and the Bay of Chesapeake on the west; divided from the residue thereof by a right line drawn from the promontory or headland called Watkins Point, situate upon the bay aforesaid, near the River Wighco on the west unto the main ocean on the east, and between that boundary on the south unto that part of the Bay of Delaware on the north, which lieth under the fortieth degree of north latitude from the equinoctial, where New England is terminated; and all the tract of that land within the metes underwritten (that is to say), passing from the said bay, called Delaware Bay, in a right line, by the degree aforesaid, unto the true meridian of the first fountain of the River Pattowmack; thence verging towards the south unto the farther bank of the said river, and following the same on the west and south unto a certain place called Cinquack, situate near the mouth of said river where it disembogues into the aforesaid Bay of Chesapeake, and thence by the shortest line unto the aforesaid promontory or place called Watkins Point, so that the whole tract of land divided by the line aforesaid, between the main ocean and Watkins Point unto the promontory called Cape Charles, may entirely remain forever excepted to us * * * * * *.

By an examination of the limits laid down in this charter, and a comparison with the several charters of Virginia and the charter and deeds to William Penn, it will be seen that there was a conflict of boundaries on both sides of the Maryland grant.

The history of the long controversy with Pennsylvania has already been given (*vide* Pennsylvania, p. 85, and Delaware, p. 87). Virginia on the south claimed the territory under her charters, and for a time seemed disposed to assert her claim, notwithstanding we find in 1638 a proclamation by the governor and council of Virginia recognizing the province of Maryland, and forbidding trade with the Indians within the limits of Maryland without the consent of Lord Baltimore previously obtained (*vide* Bozman's Maryland, vol. II, p. 586). Virginia's claim was finally given up by a treaty or agreement made in 1658. (For a full account *vide* Bozman's Maryland, p. 444 *et seq.*)

In 1663 the Virginia assembly ordered a survey of the line between Virginia and Maryland on the peninsula, and declared it to be as follows, viz:

> From Watkins Point east across the peninsula.

They define Watkins Point

> To be the north side of Wicomicoe River on the Eastern shore and neere unto and on the south side of the streight limbe opposite to Patuxent River.

(*Vide* Hening's Virginia, vol. II, p. 184.)

In 1668 commissioners were appointed by Maryland and Virginia to fix the boundary across the peninsula. The commissioners were Philip Calvert, esq., chancellor of Maryland, and Col. Edmund Scarbrugh, his majesty's surveyor-general of Virginia. Their report is as follows, viz:

> * * * After a full and perfect view taken of the point of land made by the north side of Pocomoke Bay and south side of Annamessexs Bay have and do conclude the same to be Watkins Point, from which said point so called, we have run an east line, agreeable with the extreamest part of the westermost angle of the said Watkins Point, over Pocomoke River to the land near Robert Holston's, and there have marked certain trees which are so continued by an east line running over Swansecutes Creeke into the marsh of the seaside with apparent marks and boundaries * * * Signed June 25, 1868. (*Vide* Md. Hist. Soc. Coll. of State papers, volume marked 4 L. C. B., pp. 63–64.)

Virginia, by the adoption of her constitution of 1776 (see Article 21), relinquished all claim to territory covered by the charter of Maryland, thereby fixing Maryland's western boundary as follows:

> Commencing on a true meridian of the first fountain of the river Pattawmack, thence verging towards the south unto the further bank of the said river and following the same on the west and south unto a certain place called Cinquack, situate near the mouth of said river where it disembogues into the aforesaid bay of Chesopeake, and thence by the shortest line unto the aforesaid promontory or place called Watkins Point, thence a right line to the main ocean on the east. (See charter of Maryland.)

The foregoing are substantially the present boundaries; but from that time up to the present a controversy has been going on concerning them.

In 1786 a compact was entered into between the States of Maryland and Virginia, but as this referred more particularly to the navigation and exercise of jurisdiction on the waters of Chesapeake Bay, the Potomac and Pocomoke Rivers, they are not given here. (*Vide* Hening's Va., Vol. XII, p. 50.)

From 1821 to 1858 frequent legislation took place in regard to thi boundary.

In the last-named year commissioners were appointed by Maryland and Virginia, respectively, who, with the assistance of Lieut. N. Michler, United States Engineers, surveyed the lines.

In 1860 the governor of Virginia, under a resolution of the legislature, appointed and sent an agent to England to collect records anc documentary evidence bearing on this question.

The rebellion ensuing, nothing further was done until 1867, whe legislation again commenced.

The question of this boundary was referred to arbitrators by a agreement made in 1874, each State binding itself to accept their awar as final and conclusive.

J. S. Black, of Pennsylvania; William A. Graham, of North Carolina, and Charles A. Jenkins, of Georgia, were appointed arbitrators.

William A. Graham having died, James B. Beck, of Kentucky, wa appointed in his stead.

The arbitrators made, in 1877, the following award, viz:

Beginning at the point on the Potomac River where the line between Virginia an West Virginia strikes the said river at low-water mark, and thence following th meanderings of said river by the low-water mark to Smith's Point, at or near th mouth of the Potomac, in the latitude 37° 53′ 8″ and longitude 76° 13′ 46″; thenc crossing the waters of the Chesapeake Bay, by a line running north 65° 30′ eas about nine and a half nautical miles to a point on the western shore of Smith' Island at the north end of Sassafras Hammock, in latitude 37° 57′ 13″, long tude 76° 2′ 52″; thence across Smith's Island south 88° 30′ east five thousand s hundred and twenty yards to the center of Horse Hammock, on the eastern shor of Smith's Island, in latitude 37° 57′ 8″, longitude 75° 59′ 20″; thence south 79 30′ east four thousand eight hundred and eighty yards to a point marked "A on the accompanying map, in the middle of Tangier Sound, in latitude 37° 5 42″, longitude 75° 56′ 23″, said point bearing from James Island light south 54 west, and distant from that light three thousand five hundred and sixty yards thence south 10° 30′ west four thousand seven hundred and forty yards by a line dividing the waters of Tangier Sound, to a point where it intersects the straight lin from Smith's Point to Watkins Point, said point of intersection being in latitude 37 54′ 21″, longitude 75° 56′ 55″, bearing from James Island light south 29° west an from Horse Hammock south 34° 30′ east. This point of intersection is marked "B on the accompanying map. Thence north 85° 15′ east six thousand seven hundred an twenty yards along the line above mentioned, which runs from Smith's Point to Watkins Point until it reaches the latter spot, namely Watkins Point, which is in lat tude 37° 54′ 38″, longitude 75° 52′ 44″. From Watkins Point the boundary line run due east seven thousand eight hundred and eighty yards to a point where it meets line running through the middle of Pocomoke Sound, which is marked "C" on th accompanying map, and is in latitude 37° 54′ 38″, longitude 75° 47′ 50″; thence by line dividing the waters of Pocomoke Sound north 47° 30′ east five thousand tw hundred and twenty yards to a point in said sound marked "D" on the accompanying map, in latitude 37° 56′ 25″, longitude 75° 45′ 26″; thence following the middl

> of Pocomoke River by a line of irregular curves, as laid down on the accompanying map, until it intersects the westward protraction of the boundary line marked by Scarborough and Calvert, May 28, 1668, at a point in the middle of Pocomoke River, and in the latitude 37° 59′ 37″, longitude 75° 37′ 4″; thence by the Scarborough and Calvert line, which runs 5° 15′ north of east, to the Atlantic Ocean.
>
> The latitudes, longitudes, courses, and distances here given have been measured upon the Coast Chart No. 33 of U. S. Coast Survey, sheet No. 3, Chesapeake Bay. * * * The middle thread of the Pocomoke River and the low-water mark on the Potomac River are to be measured from headland to headland, without considering or following arms, inlets, creeks, bays, or affluent rivers. * * * (*Vide* U. S. Stat. at Large, Vol. XX, p. 481.)

This award was ratified by the States of Maryland and Virginia, and confirmed by Congress in 1879.

In 1879–'80 acts were passed by the legislatures of Maryland and Virginia to appoint commissioners and to request the General Government to designate one or more officers of the Engineer Corps, said commissioners and officers to survey and mark said line and erect monuments thereon.

West Virginia having been formed from a part of Virginia and admitted into the Union in 1862, the western boundary of Maryland now separates it from the State of West Virginia.

The commissioners appointed in 1859 by Virginia and Maryland (*vide* p. 90) surveyed the western boundary from the "Fairfax Stone" (the first fountain of the Potomac) due north to the Pennsylvania line, and the legislature of Maryland in 1860 passed an act declaring that line to to be its western boundary.

From the "Fairfax Stone" the boundary between Maryland and West Virginia runs along the south bank of the Potomac River till it strikes the line between Virginia and West Virginia.

(For a history of the placing of the Fairfax Stone, *vide* Virginia, p. 96.)

DISTRICT OF COLUMBIA.

On the 5th day of September, 1774, the Continental Congress met at Philadelphia. Two years later they adjourned to Baltimore. During the Revolution and subsequent to the treaty of peace they met in various places. After the close of the war much debate took place in regard to the location of a permanent seat of the Government of the United States. Several States made propositions to Congress, offering to cede certain lands for the purpose, but no determination of the location was made by Congress until 1790.

Act of cession from the State of Maryland, passed December 23, 1788.

On the 23d of December, 1788, the State of Maryland passed the following act, viz:

> *Be it enacted by the general assembly of Maryland*, That the representatives of this

State in the House of Representatives of the Congress of the United States, appointe to assemble at New York, on the first Wednesday of March next, be and they a hereby authorised and required on the behalf of this State to cede to the Congress the United States, any district in this State not exceeding ten miles square, which th Congress may fix upon and accept for the seat of government of the United States.

In the following year (December 3, 1789), the State of Virginia passe a similar act, of which the following is an extract:

Be it therefore enacted by the general assembly, That a tract of country not exceedin ten miles square or any lesser quantity, to be located within the limits of the Stat and in any part thereof as Congress may by law direct shall be, and the same is hereb forever ceded and relinquished to the Congress and Government of the United State in full and absolute right and exclusive jurisdiction, as well of said soil as of perso residing or to reside thereon, pursuant to the tenor and effect of the eighth secti of the 1st article of the Constitution of the Government of the United States.

After long discussion, Congress in 1790, in view of the foregoing ce sions of Maryland and Virginia, passed the following act, viz:

AN ACT for establishing the temporary and permanent seat of government of the United Stat
Approved July 16, 1790.

SECT. 1. *Be it enacted by the Senate and House of Representatives of the United States America in Congress assembled,* That a district of territory, not exceeding ten mil square, to be located as hereafter directed on the river Potowmac, at some place b tween the mouth of the Eastern Branch and Connoyocheque, be, and the same hereby, accepted for the permanent seat of the government of the United State *Provided nevertheless,* That the operation of the laws of the State within such distric shall not be affected by this acceptance until the time fixed for the removal of the go ernment thereto, and until Congress shall otherwise by law provide.

SECT. 2. *And be it further enacted,* That the President of the United States be autho ized to appoint, and by supplying vacancies happening from refusals to act or othe causes, to keep in appointment as long as may be necessary, three commissioner who, or any two of whom, shall, under the direction of the President, survey, and b proper metes and bounds define and limit, a district of territory, under the limitation above mentioned; and the district so defined, limited, and located shall be deeme the district accepted by this act for the permanent seat of the government of th United States.

SECT. 3. *And be it enacted,* That the said commissioners, or any two of them, sha have power to purchase or accept such quantity of land on the eastern side of the sai river within the said district as the President shall deem proper for the use of th United States, and according to such plans as the President shall approve. The sai commissioners, or any two of them, shall, prior to the first Monday in December i the year 1800, provide suitable buildings for the accommodation of Congress, and the President, and for the public offices of the government of the United States.

SECT. 4. *And be it enacted,* That for defraying the expenses of such purchases an buildings the President of the United States be authorized and requested to accep grants of money.

SECT. 5. *And be it enacted,* That prior to the first Monday in December next all offic attached to the seat of government of the United States shall be removed to, a until the first Monday in December in the year 1800 shall remain at, the city of Phil delphia, in the State of Pennsylvania, at which place the session of Congress ne ensuing the present shall be held.

SECT. 6. *And be it enacted,* That on the first Monday in December, in the year 180 the seat of the government of the United States, shall, by virtue of this act, be tran ferred to the district and place aforesaid. And all offices attached to the said seat government shall accordingly be removed thereto by their respective holders, an shall, after the said day, cease to be exercised elsewhere, and that the necessary expense of said removal, shall be defrayed out of the duties on imposts and tonnage, of which a sufficient sum is hereby appropriated.

In the following year the foregoing act was amended, in order to include a portion of the Anacostia River ("Eastern Branch"), and the town of Alexandria within the limits of the district.

The following is the act of amendment:

AN ACT to amend "An act for establishing the temporary and permanent seat of government of the United States." Approved March 3, 1791.

Be it enacted, &c., That so much of the act entitled "An act for establishing the temporary and permanent seat of the government of the United States, as requires that the whole of the district of territory, not exceeding ten miles square, to be located on the river Potowmac, for the permanent seat of the government of the United States, shall be located above the mouth of the Eastern Branch, be and is hereby repealed, and that it shall be lawful, for the President to make any part of the territory below said limit and above the mouth of Hunting Creek, a part of the said district so as to include a convenient port of the Eastern Branch, and of the lands lying on the lower side thereof; and also the town of Alexandria, and the territory so to be included shall form a part of the district not exceeding ten miles square for the permanent seat of the government of the United States, in like manner, and to all intents and purposes, as if the same had been within the the purview of the above recited act: *Provided*, That nothing herein contained, shall authorize the erection of the public buildings, otherwise than on the Maryland side of the river Potowmac, as required by the aforesaid act.

In pursuance of the foregoing acts, three commissioners were appointed, who made preliminary surveys of the territory, and on the 30th day of March, 1791, George Washington, President of the United States, issued a proclamation, in which the bounds of the said District were defined as follows, viz:

Beginning at Jones' Point, being the upper cape of Hunting Creek, in Virginia, and at an angle in the outset of 45° west of the north, and running in a direct line ten miles for the first line; then beginning again at the same Jones' Point and running another direct line at a right angle with the first, across the Potomac, ten miles for the second line; then, from the terminations of the said first and second lines, running two other direct lines, of ten miles each, the one crossing the Potomac and the other the Eastern Branch aforesaid, and meeting each other in a point.

In 1800 Congress removed to this District. In the following year the District was divided into two counties, as follows, viz:

UNITED STATES STATUTES AT LARGE, SIXTH CONGRESS, SECOND SESSION, 1801, (CHAPTER XV).

AN ACT concerning the District of Columbia.

The said District of Columbia shall be formed into two counties. One county shall contain all that part of said District which lies on the east side of the river Potomac, together with the islands therein, and shall be called the county of Washington, the other county shall contain all that part of said District which lies on the west side of said river, and shall be called the county of Alexandria; and the said river, in its whole course through said District, shall be taken and deemed to all intents and purposes to be within both of said counties.

In 1846 Congress passed an act retroceding to the State of Virgini
that part of the District of Columbia originally ceded to the Unit
States by Virginia. The following is an extract from said act of retr
cession:

> That with assent of the people of the county and town of Alexandria, to be asc
> tained as hereinafter prescribed, all of that portion of the District of Columbia ced
> to the United States by the State of Virginia, and all the rights and jurisdicti
> therewith ceded over the same, be, and the same are, hereby ceded and forever r
> linquished to the State of Virginia in full and absolute right and jurisdiction, as w
> of soil as of persons residing or to reside thereon.

VIRGINIA.

In the year 1606 King James I of England granted the "First Cha
ter of Virginia." The boundaries therein described are as follows, vi

> * * * Situate, lying, or being all along the sea coasts, between four and thir
> degrees of northerly latitude from the equinoctial line, and five and forty degrees
> the same latitude, and in the main land between the same four and thirty and fi
> and forty degrees and the islands thereunto adjacent, or within one hundred miles
> the coast thereof. * * *

Soon after, in 1609, a new charter was granted, called the "Secon
Charter of Virginia," which defines the boundaries in the followin
terms:

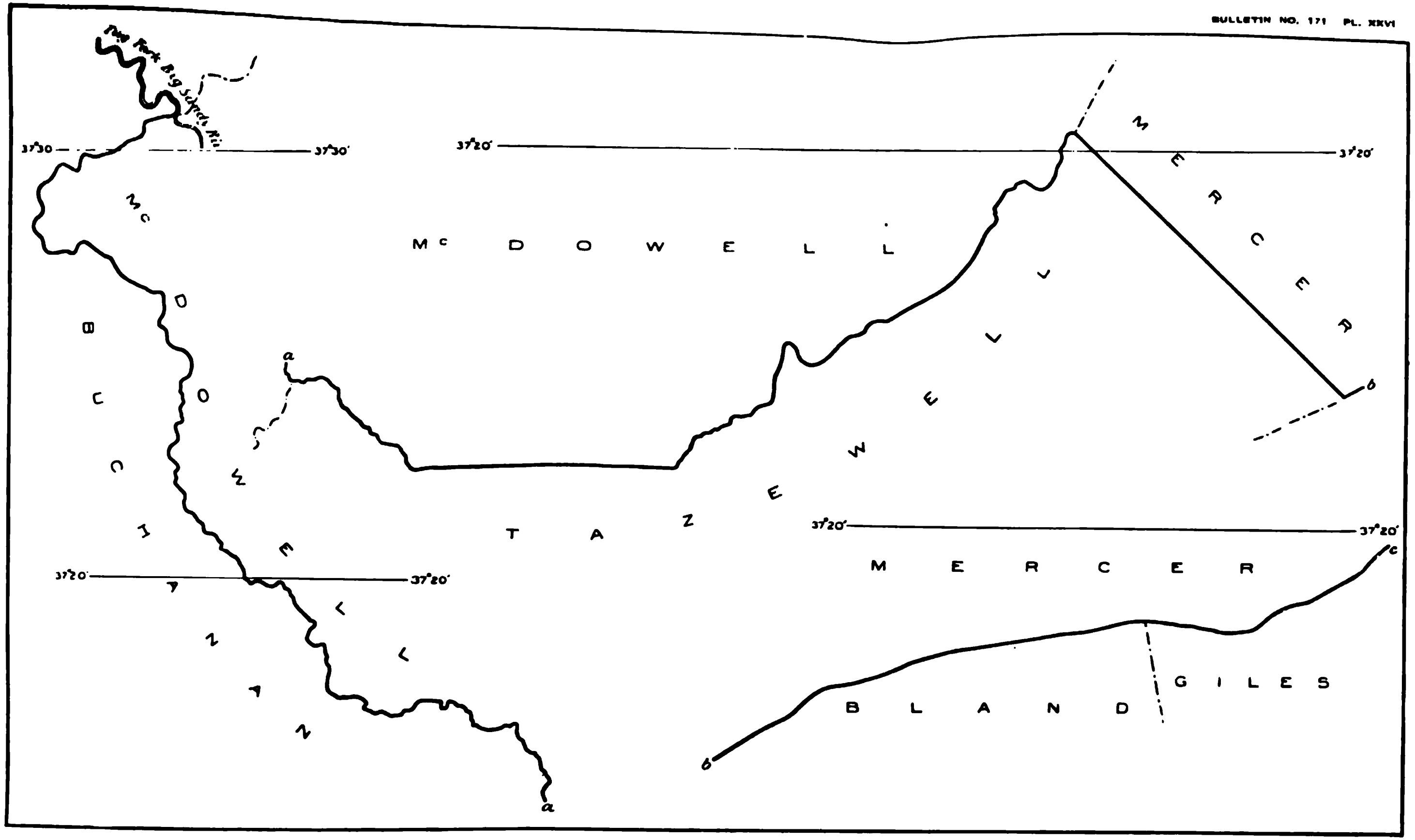
> * * * Situate, lying, and being in that part of America called Virginia, fro
> the point of land called Cape or Point Comfort, all along the sea coast to the nort
> ward two hundred miles, and from the said point of Cape Comfort all along the s
> coast to the southward two hundred miles, and all that space and circuit of la
> lying from the sea coast of the precinct aforesaid up into the land, throughout fro
> sea to sea, west and northwest, and also all the islands lying within one hundr
> miles along the coast of both seas of the precinct aforesaid. * * *

In 1611–'12 the "Third Charter of Virginia" was granted, which w
an enlargement of the second, of which the following is an extract:

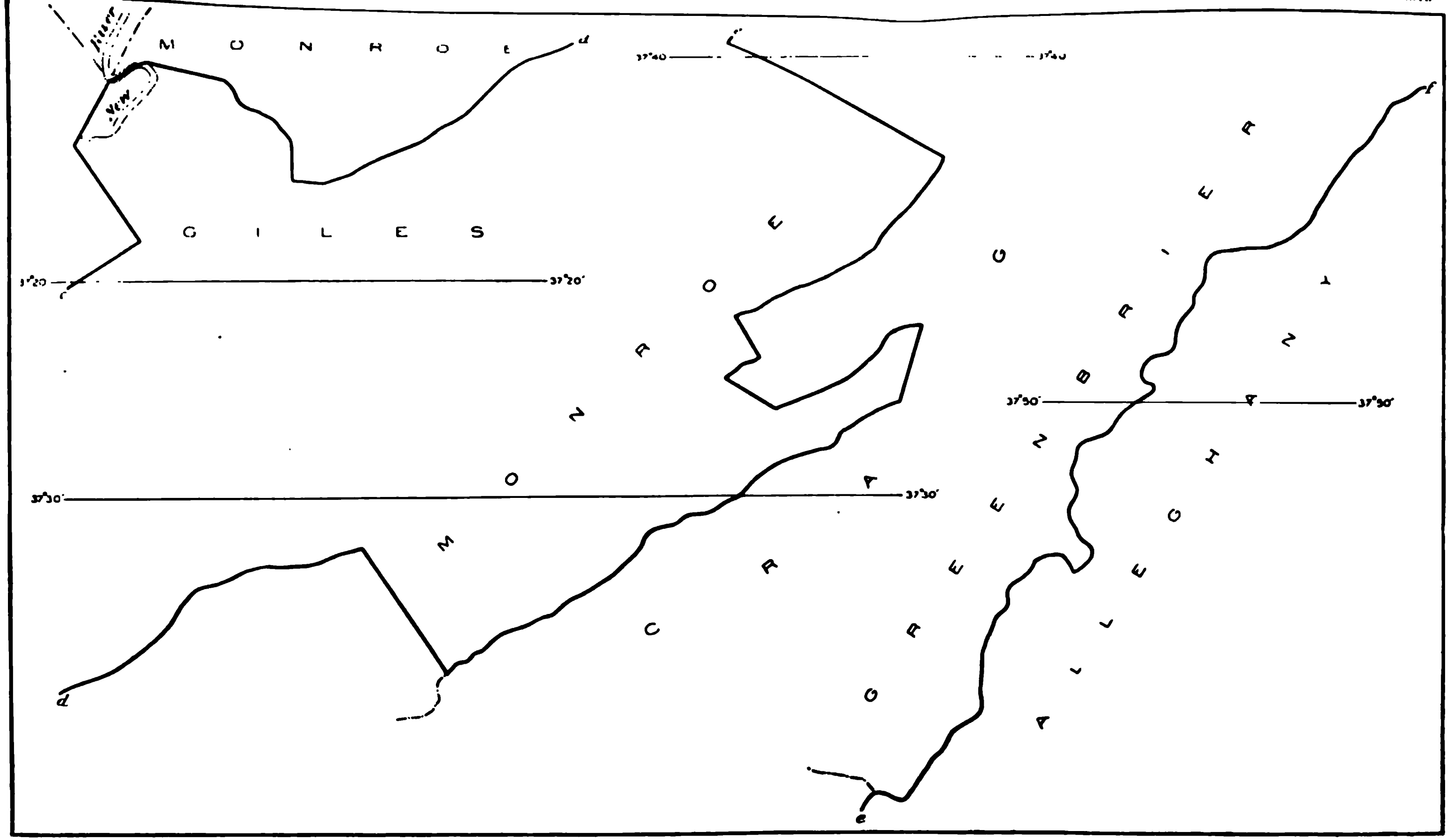
> All and singular those islands whatsoever, situate and being in any part of the oce
> seas bordering upon the coast of our said first colony in Virginia, and being with
> three hundred leagues of any of the portes heretofore granted to the said treasur
> and company in our former letters-patents as aforesaid, and being within or betwe
> the one-and-fortieth and thirtieth degrees of northerly latitude.

These boundaries, as will be seen, included territory composing wholl
or in part, the present States of Pennsylvania, Delaware, Marylan
North and South Carolina, in addition to others formed since the Rev
lution.

This large extent of territory was reduced in the first instance by th
charter of Maryland in 1632, next by the charters of Carolina in 166
and 1665, then by the charter of Pennsylvania in 1681, and, again, sub
sequent to the Revolution, by the cession to the United States of th
territory northwest of the Ohio River in 1784; by the admission o



BOUNDARY BETWEEN VIRGINIA AND WEST VIRGINIA.



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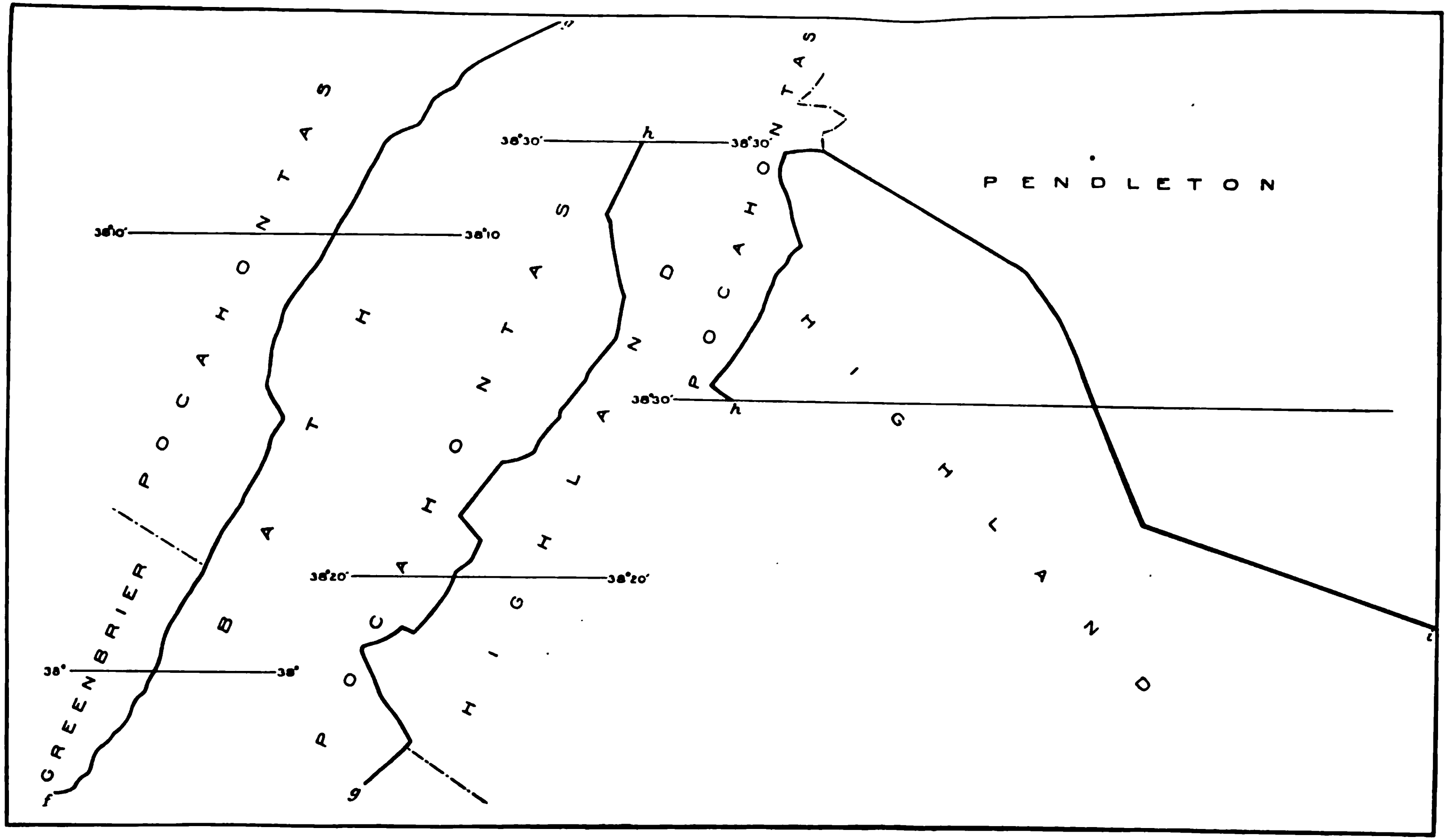

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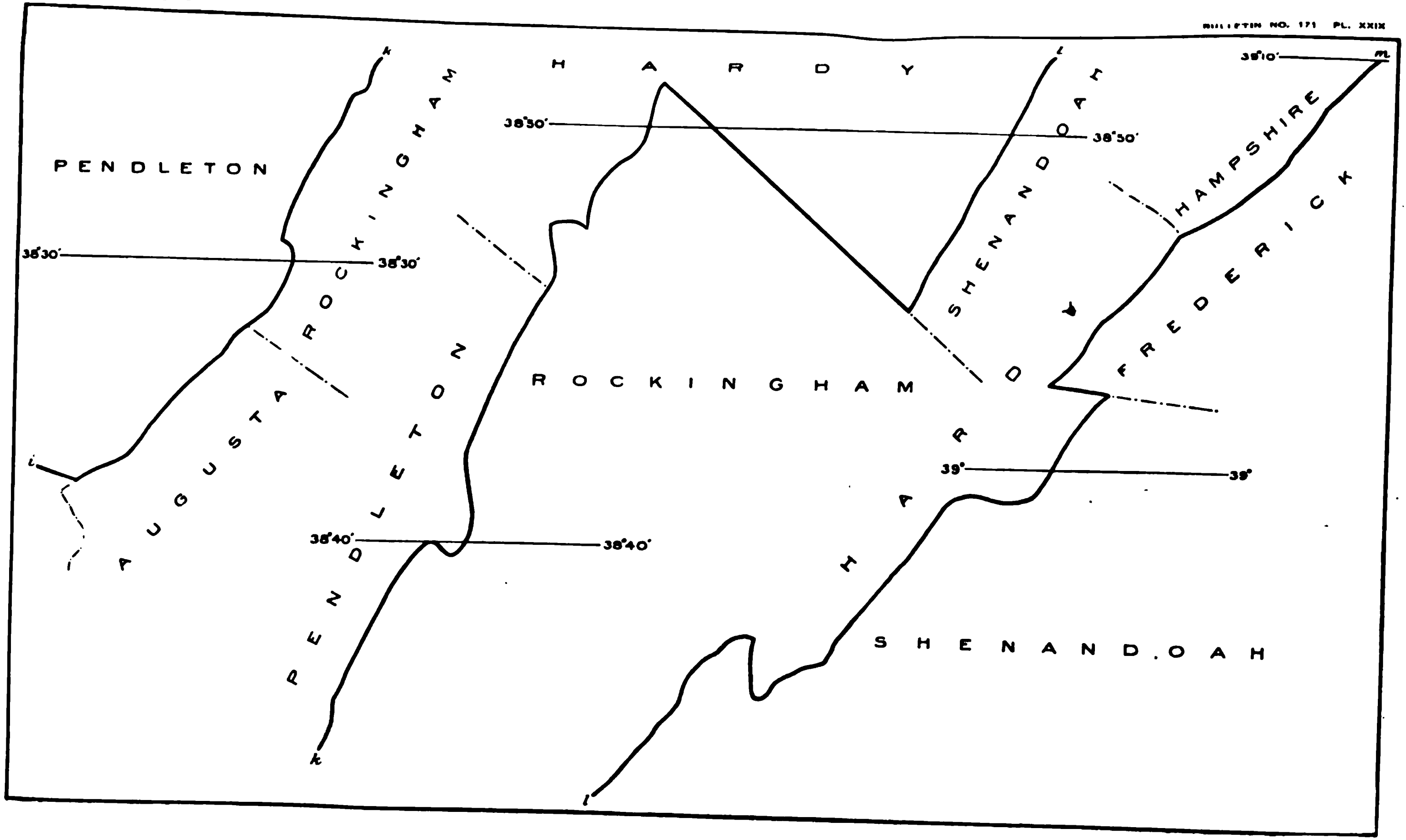

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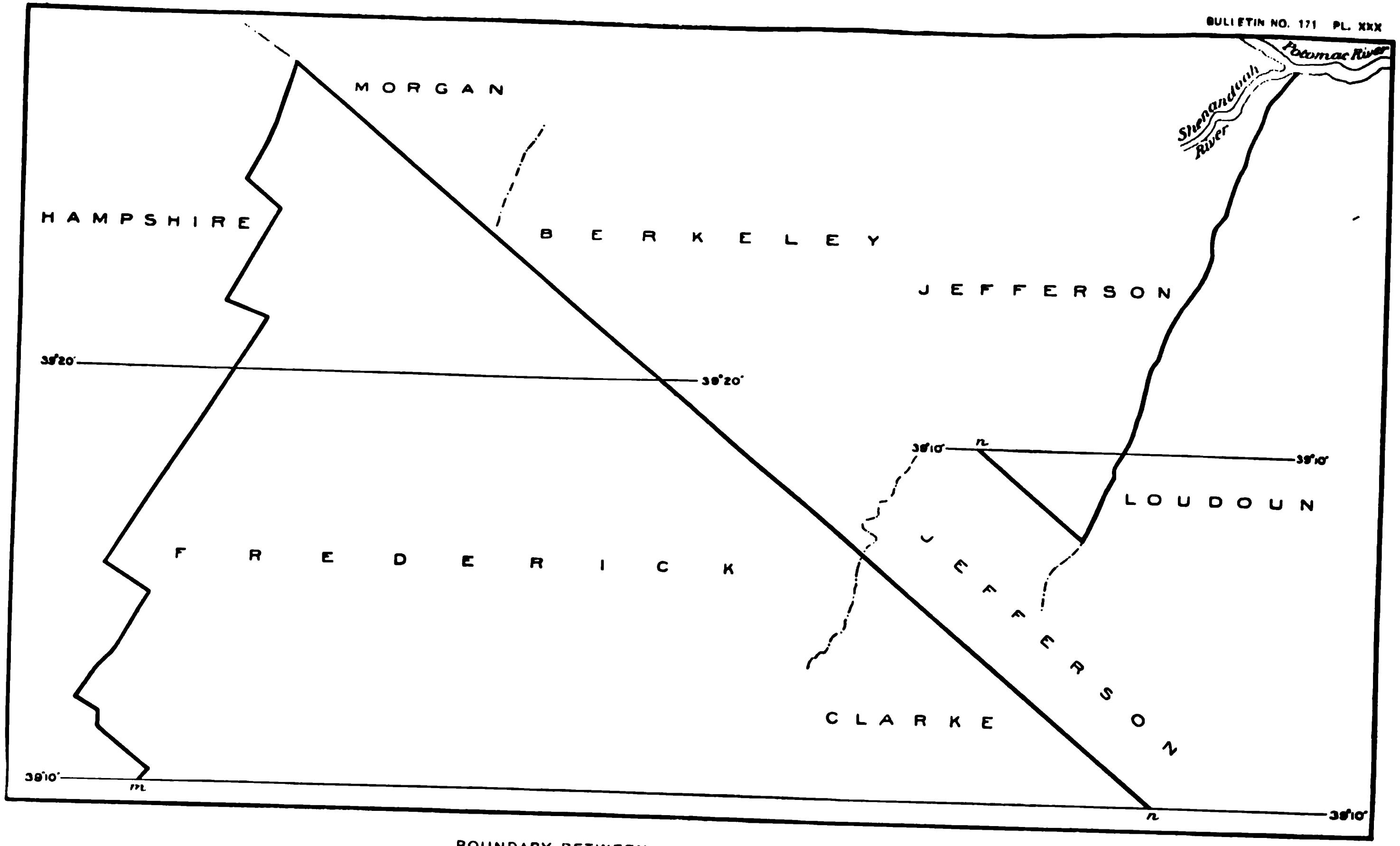


BOUNDARY BETWEEN VIRGINIA AND WEST VIRGINIA.

Kentucky as an independent State in 1792, and lastly by the division of the territory of Virginia in 1862, by which the new State of West Virginia was created and admitted into the Union.

By the constitution of 1776 Virginia formally gave up all claim to the territory now appertaining to the neighboring States of Maryland, Pennsylvania, North and South Carolina.

The following is an extract from the Virginia constitution of 1776:

> The territories contained within the charters erecting the colonies of Maryland, Pennsylvania, North and South Carolina, are hereby ceded, released, and forever confirmed to the people of these colonies, respectively, with all the rights of property, jurisdiction, and government, and all the rights whatsoever, which might at any time heretofore have been claimed by Virginia, except the free navigation and use of the rivers Potomaque and Pokomoke, with the property of the Virginia shores and strands bordering on either of said rivers, and all improvements which have been or shall be made thereon. The western and northern extent of Virginia shall, in all other respects, stand as fixed by the charter of King James I, in the year one thousand six hundred and nine, and by the public treaty of peace between the courts of Britain and France in the year one thousand seven hundred and sixty-three, unless by act of the legislature one or more governments be established westwards of the Alleghany Mountains.

In the mean time a grant of territory had been made, within the present limits of Virginia and West Virginia, which caused great dissatisfaction to the people of the Virginia Colony, and which ultimately had an important bearing in settling the divisional line between Maryland and Virginia.

In the 21st year of Charles II a grant was made to Lord Hapton and others of what is called the northern neck of Virginia, which was sold by the other patentees to Lord Culpeper and confirmed to him by letters-patent in the fourth year of James II. This grant carried with it nothing but the right of soil and incidents of ownership, it being expressly subjected to the jurisdiction of the government of Virginia. The tract of land thereby granted was " bounded by and within the heads of the rivers Tappahannock, alias Rappahannock, and Quiriough, alias Potomac, rivers." On the death of Lord Culpeper, this proprietary tract descended to Lord Fairfax, who had married Lord Culpeper's only daughter.

As early as 1729 difficulties sprung up, arising from conflicting grants from Lord Fairfax and the Crown.

In 1730 Virginia petitioned the King, reciting that the head springs of the Rappahannock and Potomac Rivers were not known, and praying that such measures might be taken that they might be ascertained to the satisfaction of all parties.

In 1733 Lord Fairfax made a similar petition, asking that a commission might issue for running out, marking, and ascertaining the true boundaries of his grant.

An order, accordingly, was issued and three commissioners were appointed on the part of the Crown and three on the part of Lord Fairfax.

The duty which devolved upon these commissioners was to ascertai by actual examination and survey the respective fountains of the Rappahannock and Potomac Rivers. This survey was made in 1736.

The report of the commissioners was referred to the council for plantation affairs in 1738, who reported their decision in 1745, as follows viz:

> * * * The said boundary ought to begin at the first spring of the south branc of the river Rappahannock, and that the said boundary be from thence drawn in straight line northwest to the place in the Alleghany Mountains where that part the Potomac River, which is now called Cohongoroota, first rises. * * *

This report was confirmed by the King, and commissioners were appointed to run and mark the dividing line accordingly.

The line was run in 1746. On the 17th day of October, 1746, the planted the Fairfax stone at the spot which had been described an marked by the preceding commissioners as the true head spring of th Potomac River, and which, notwithstanding much controversy, ha continued to be regarded, from that period to the present time, as th southern point of the western boundary between Virginia and Maryland. (*Vide* Faulkner's Report to Governor of Virginia, 1832. For ful details, *vide* Byrd Papers, 1866, Vol. II, p. 83 *et seq.* Also Hening' Va. Statutes.)

This tract of country was held by Lord Fairfax and his descendant many years, but subsequent to the Revolution the quitrents, charge etc., were abolished and it became in all respects subject to the juri diction of Virginia.

(For the history of the settlement of the boundary lines between Vi ginia and Maryland, *vide* Maryland, p. 89.)

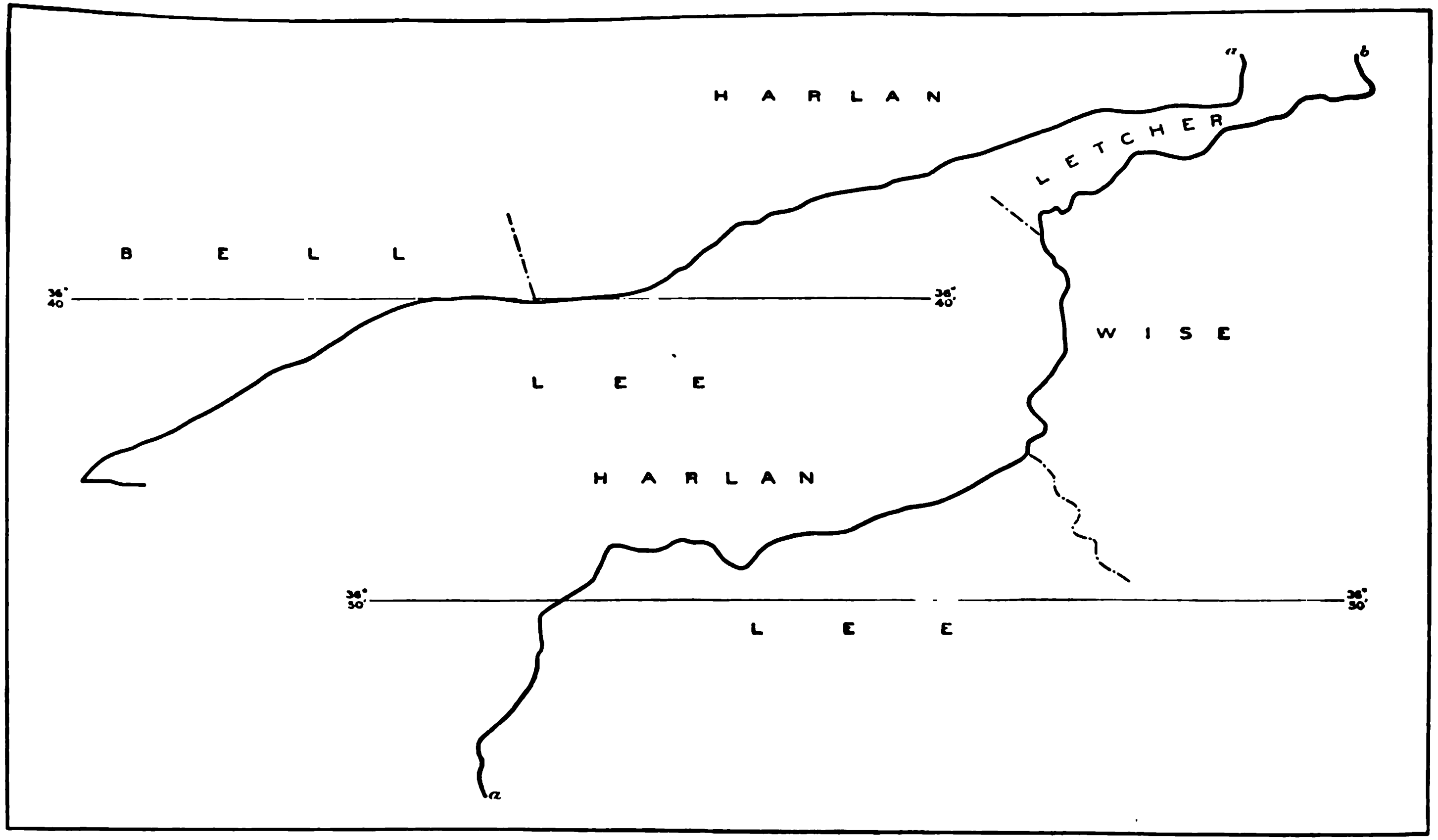
(For a history of the boundary between Virginia and Pennsylvania *vide* Pennsylvania, p. 87.)

Kentucky formed originally a part of the county of Fincastle, Vi ginia. In the year 1776, this county was divided into three countie the westernmost of which was called Kentucky County, and its easter boundary was declared to be as follows, viz:

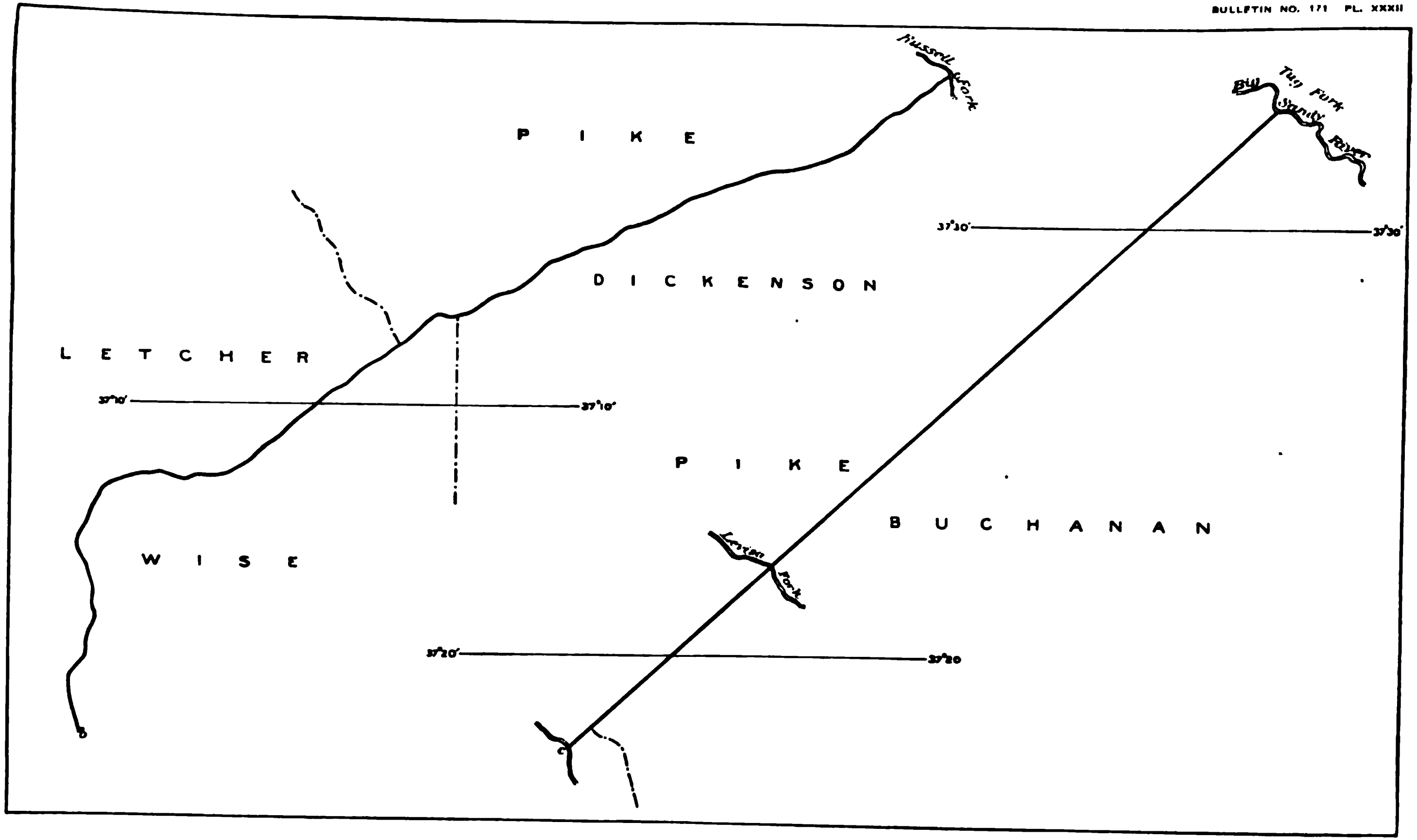
> A line beginning on the Ohio, at the mouth of Great Sandy Creek, and runnin up the same and the main or northeasterly branch thereof to the Great Laurel Rid or Cumberland Mountains; thence southwesterly along the said mountain to the li of North Carolina. (See Hening's Statutes, Virginia, Vol. 9, p. 257.)

Kentucky having been admitted into the Union June 1, 1792, commissioners were appointed in 1798 by Virginia and Kentucky to fix th boundary. In 1799–1800 the commissioners' report was made and rat fied by the States. It was as follows, viz:

> To begin at the point where the Carolina, now Tennessee, line crosses the top of t Cumberland Mountains, near Cumberland Gap, thence northeastwardly along the to or highest part of the said Cumberland Mountain, keeping between the head wate of Cumberland and Kentucky Rivers, on the west side thereof, and the head wate of Powell's and Guest's Rivers, and the Pond Fork of Sandy, on the east side thero continuing along the said top, or highest part of said mountain, crossing the ro



BOUNDARY BETWEEN VIRGINIA AND KENTUCKY.



BOUNDARY BETWEEN VIRGINIA AND KENTUCKY.

> leading over the same at the Little Paint Gap, where by some it is called the Hollow Mountain and where it terminates at the West Fork of Sandy, commonly called Russell's Fork, thence with a line to be run north 45° east till it intersects the other great principal branch of Sandy, commonly called the Northeastwardly branch, thence down the said Northeastwardly branch to its junction with the main west branch and down Main Sandy to its confluence with the Ohio. (See Shepard's Virginia, Vol. 2, p. 234.)

It will be seen that the latter part of this line is the present line between West Virginia and Kentucky.

(For the history of the settlement of the boundaries between Virginia and North Carolina, *vide* North Carolina, *vide* p. 100.)

In 1779 Virginia and North Carolina appointed commissioners to run the boundary line between the two States west of the Allegheny Mountains, on the parallel of 36° 30′. The commissioners were unable to agree on the location of the parallel; they therefore ran two parallel lines two miles apart, the northern known as Henderson's, and claimed by North Carolina, the southern known as Walker's line, and claimed by Virginia. In the year 1789 North Carolina ceded to the United States all territory west of her present boundaries, and Tennessee being formed from said ceded territory, this question became one between Virginia and Tennessee.

Commissioners having been appointed by Virginia and Tennessee to establish the boundary, their report was adopted in 1803, and was as follows, viz:

> A due west line equally distant from both Walker's and Henderson's, beginning on the summit of the mountain generally known as White Top Mountain, where the northeast corner of Tennessee terminates, to the top of the Cumberland Mountain, where the southwestern corner of Virginia terminates.

In 1871 Virginia passed an act to appoint commissioners to adjust this line.

Tennessee, the following year, in a very emphatic manner, passed a resolution refusing to reopen a question regarding a boundary which she considered "fixed and established beyond dispute forever." (See acts of Tennessee, 1872.)

Up to 1783 Virginia exercised jurisdiction over a large tract of country northwest of the Ohio River. But by a deed executed March 1, 1784, she ceded to the United States all territory lying northwest of the Ohio River, thus making her western boundary the west bank of the Ohio River.

On the 31st of December, 1862, the State of Virginia was divided, and 48 counties, composing the western part of the State, were made the new State of West Virginia. By an act of Congress in 1866, consent was given to the transfer of two additional counties from Virginia to West Virginia.

In 1873 and 1877 commissioners were appointed by each State to determine the true boundaries between the two States, and the General

Government was asked to detail officers of engineers to act with said commissioners in surveying and fixing the line.

Until their report is at hand, the boundary can only be found by following the old county lines. In view of the expectation of such report at an early day, it has not been thought best to go into an examination of the old county lines.

WEST VIRGINIA.

This State was set off from Virginia on December 31, 1862. It was originally formed of those counties of Virginia which had refused to join in the secession movement. It was admitted to the Union as a separate State, June 19, 1863. It originally contained the following counties: Barbour, Boone, Braxton, Brooke, Cabell, Calhoun, Clay, Doddridge, Fayette, Gilmer, Greenbrier, Hampshire, Hancock, Hardy, Harrison, Jackson, Kanawha, Lewis, Logan, Marion, Marshall, Mason, McDowell, Mercer, Monongalia, Monroe, Morgan, Nicholas, Ohio, Pendleton, Pleasants, Pocahontas, Preston, Putnam, Raleigh, Randolph, Ritchie, Roane, Taylor, Tucker, Tyler, Upshur, Wayne, Webster, Wetzel, Wirt, Wood, Wyoming.

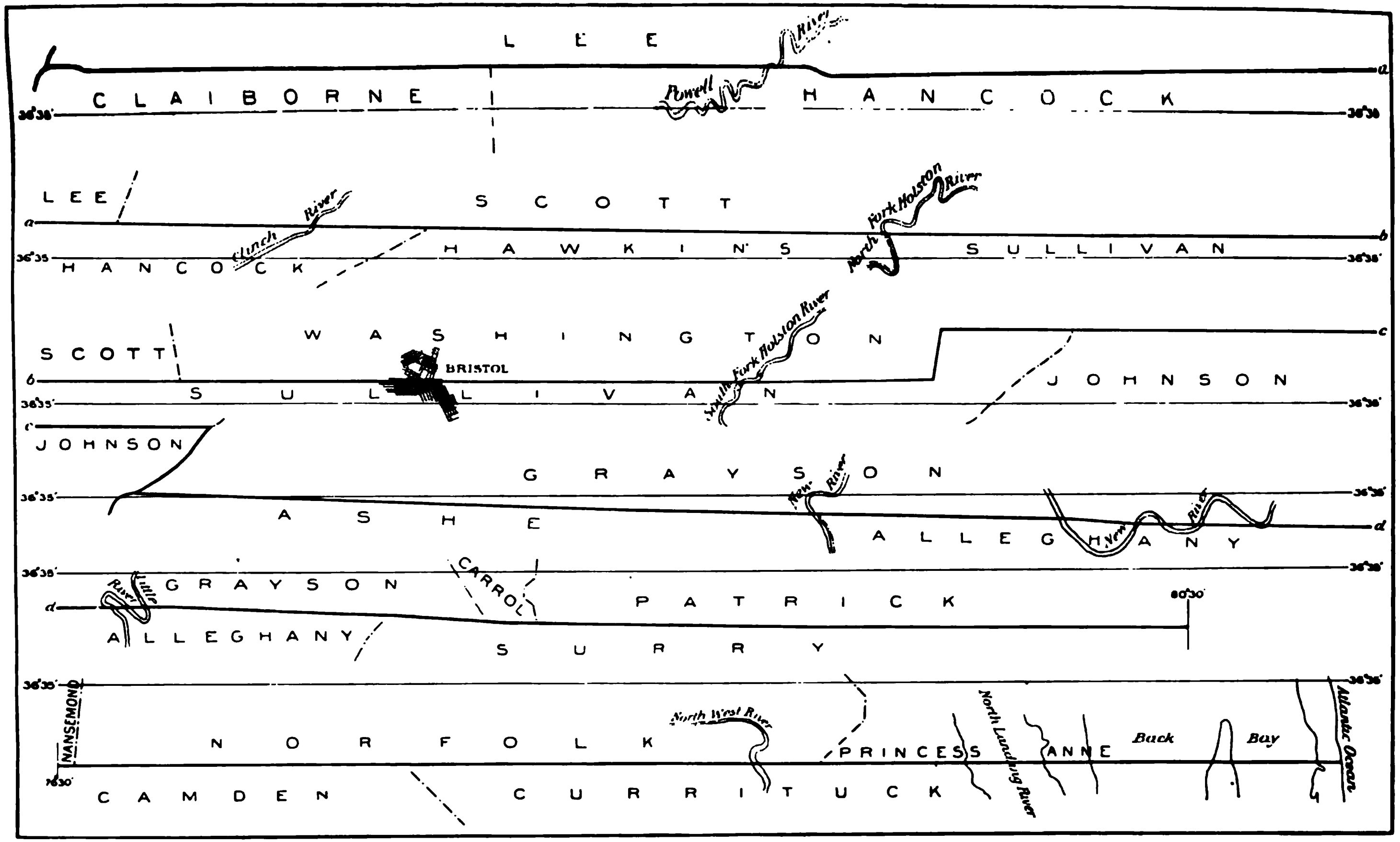
In 1866 it was enlarged by the two counties of Berkeley and Jefferson, transferred from Virginia. Its boundary with Virginia is made up of boundary lines of the border counties above enumerated; and can be defined only by reference to the laws by which these counties were created. In the constitution of 1872, after a recapitulation of the counties which were transferred from Virginia to West Virginia, is found the following clause defining the boundaries upon the south and west:

> The State of West Virginia includes the bed, bank, and shores of the Ohio River, and so much of the Big Sandy River as was formerly included in the Commonwealth of Virginia, and all territorial rights and property in and jurisdiction over the same heretofore reserved by and vested in the Commonwealth of Virginia, are vested in and shall hereafter be exercised by the State of West Virginia; and such parts of the said beds, banks, and shores as lie opposite and adjoining the several counties of this State shall form parts of said several counties respectively.

(For a history of the boundaries of West Virginia, *vide* Pennsylvania, p. 86; Maryland, p. 89; Virginia, p. 95.)

NORTH CAROLINA.

In the year 1663 the "first charter of Carolina" was granted, which, two years later, in 1665, was enlarged by the "second charter of Carolina."


LEE
CLAIBORNE
HANCOCK
Powell River
36°38'
a
LEE
SCOTT
Clinch River
North Fork Holston River
HAWKINS
SULLIVAN
HANCOCK
b
36°35'
SCOTT
WASHINGTON
BRISTOL
South Fork Holston River
SULLIVAN
JOHNSON
c
JOHNSON
GRAYSON
New River
ASHE
ALLEGHANY
d
GRAYSON
Little River
CARROL
PATRICK
80°30'
ALLEGHANY
SURRY
NANSEMOND
NORFOLK
North West River
PRINCESS ANNE
North Landing River
Back Bay
Atlantic Ocean
76°30'
CAMDEN
CURRITUCK

The following extracts from these two charters define the boundaries:

Charter of Carolina, 1663.

> * * * All that territory or tract of ground, scituate, lying and being within our dominions of America, extending from the north end of the island called Lucke Island, which lieth in the Southern Virginia seas, and within six and thirty degrees of the northern latitude, and to the west as far as the south seas, and so southerly as far as the river Saint Matthias, which bordereth on the coast of Florida, and within one and thirty degrees of northern latitude, and so west in a direct line as far as the south seas aforesaid. * * *

Charter of Carolina, 1665.

> * * * All that province, territory, or tract of land, scituate, lying or being in our dominions of America, aforesaid, extending north and eastward as far as the north end of Currituck River, or inlet, upon a strait westerly line to Wyonoke Creek, which lies within or about the degrees of thirty-six and thirty minutes, northern latitude, and so west in a direct line as far as the south seas. * * *

This is an extension of the charter of 1663, by which its northern boundary was removed from the approximate latitude of 36° to 36° 30′, on which parallel it is now approximately established. Although the exact year in which the division of the province of Carolina into the two provinces of North and South Carolina appears somewhat uncertain, I find it generally put down as 1729. The division line between the two provinces, North and South Carolina, appears to have been established by mutual agreement.

In the constitution of North Carolina of 1776 this line is defined as shown in the subjoined extract:

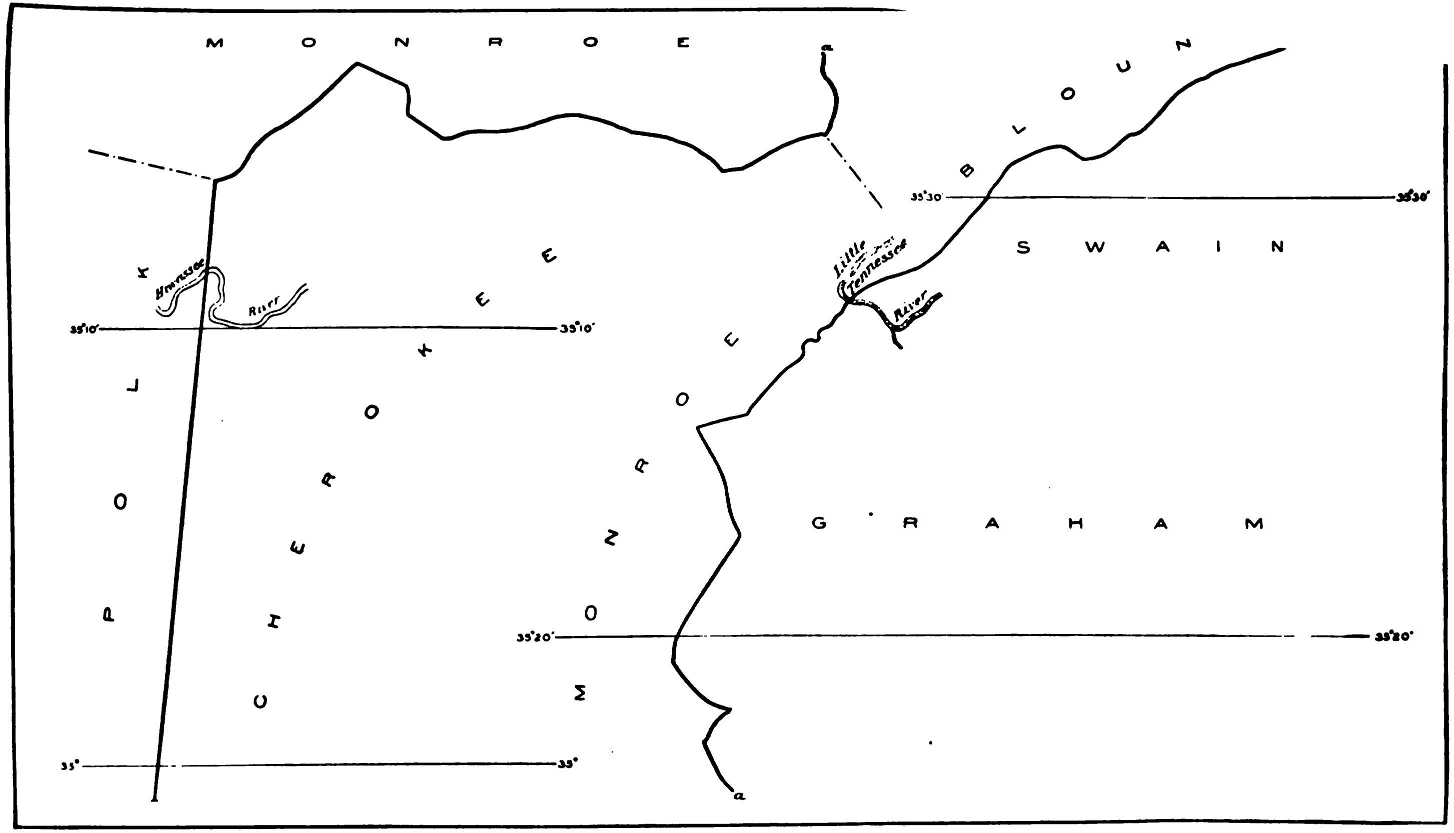
> The property of the soil, in a free government, being one of the essential rights of the collective body of the people, it is necessary, in order to avoid future disputes, that the limits of the State should be ascertained with precision; and as the former temporary line between North and South Carolina was confirmed and extended by commissioners appointed by the legislatures of the two States, agreeable to the order of the late King George II in council, that line, and that only, should be esteemed the southern boundary of this State; that is to say, beginning on the sea side at a cedar stake, at or near the mouth of Little River (being the southern extremity of Brunswic County), and running from thence a northwest course through the boundary house, which stands in thirty-three degrees fifty-six minutes, to thirty-five degrees north latitude, and from thence a west course so far as is mentioned in the charter of King Charles II to the late proprietors of Carolina. Therefore, all the territory, seas, waters, and harbours, with their appurtenances, lying between the line above described, and the southern line of the State of Virginia, which begins on the sea shore, in thirty-six degrees thirty minutes north latitude, and from thence runs west, agreeable to the said charter of King Charles, are the right and property of the people of the State, to be held by them in sovereignty, any partial line, without the consent of the legislature of this State, at any time thereafter directed or laid out in anywise notwithstanding.

On December 2, 1789, the legislature passed an act ceding to the United States its western lands, now constituting the State of Tennessee. On February 25, 1790, the deed was offered, and on April 2 of the same year it was accepted by the United States.

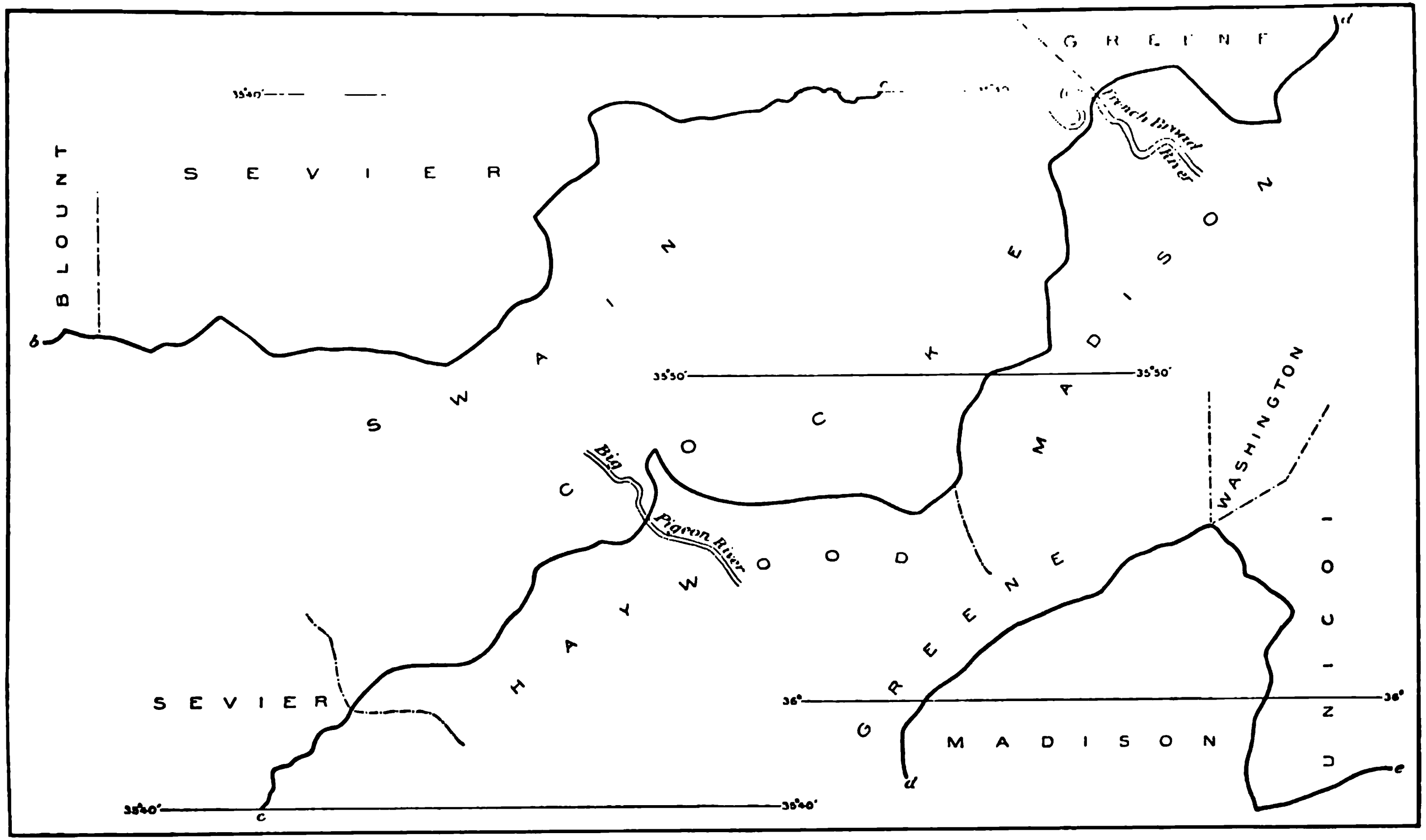
In the Revised Statutes the north and south boundaries of the State are claimed to be as follows: The northern boundary, the parallel of 36° 30′; the southern boundary, a line running northwest from Goat Island on the coast in latitude 33° 56′ to the parallel of 35°, and thence along that parallel to Tennessee; while the western boundary is the Smoky Mountains. It is strange that the Revised Statutes should contain such a statement of the boundary lines when it is thoroughly well known that it is incorrect, especially as regards the southern boundary. In the case of the northern boundary the intention has been from the earliest colonial times down to the present to establish a line upon the parallel of 36° 30′. This is found to be the wording of every legislative act relating to it, and the errors of this boundary are due simply to errors in surveying and location. The following brief and comprehensive sketch of the north and south boundary lines of this State, and of the various attempts made to locate them, is taken from Professor Kerr's "Geology of North Carolina," vol. 1, page 2:

"The first and only serious attempt to ascertain the northern boundary was that made in 1728, by Col. Wm. Byrd, and others, commissioners on the part of the two colonies, acting under Royal authority. From the account given by Byrd of this undertaking, it appears that they started from a point on the coast whose position they determined by observation to be in 36° 31′, north latitude, and ran due west (correcting for the variation of the compass), to Nottoway River, where they made an offset of a half mile to the mouth of that stream, again running west. The line was run and marked 242 miles from the coast, to a point in Stokes County, on the upper waters of the Dan River (on Peter's creek) the North Carolina commissioners accompanying the party only about two-thirds of the distance. Beyond this point, the line was carried some 90 miles by another joint commission of the two colonies in 1749; this survey, terminating at Steep Rock Creek, on the east of Stone Mountain, and near the present northwest corner of the State, was estimated to be 329 miles from the coast. In 1779 the line was taken up again at a point on Steep Rock Creek, determined by observation to be on the parallel of 36° 30′ (the marks of the previous survey having disappeared entirely), and carried west to and beyond Bristol, Tennessee. This last is known as the Walker line, from one of the commissioners of Virginia.

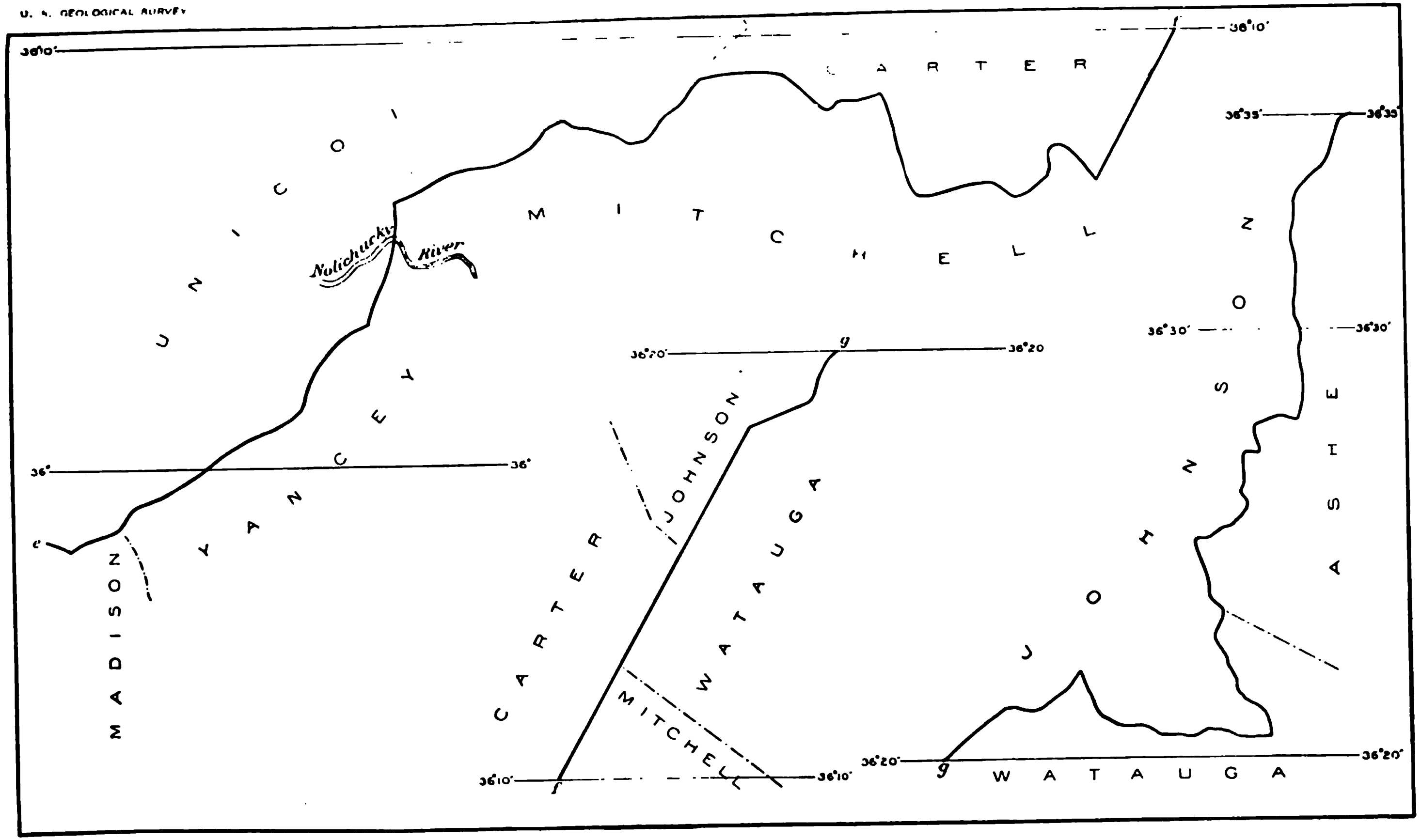
These lines were run and the latitude observations taken with very imperfect instruments, and the variation of the compass was little understood, so that it was not possible to trace a parallel of latitude. The line, besides, was only marked on the trees and soon disappeared, and as the settlements were very scattered the location soon became a matter of vague tradition and presently of contention and litigation, so that in 1858, at the instance of Virginia, commissioners were appointed to relocate the line from the end of the Byrd survey westward, but for some reason they did not act. In 1870 commissioners were again appointed by Virginia and similar action asked on the part of this State; and the proposition was renewed in 1871, but ineffectually, as before. In all these numerous attempts to establish the line of division between the two colonies and States, the intention and the specific instructions have been to ascertain and mark, as the boundary of the two States, *the parallel of 36° 30′*. The maps published towards the end of last century by Jefferson and others give that parallel as the line, and the bill of rights of North Carolina claims that "all the territory lying between the line above described (the line between North and South Carolina) and the southern line of the State of Virginia, which begins on the sea shore in 36° 30′ north latitude, and from thence runs west, agreeably to the



BOUNDARY BETWEEN NORTH CAROLINA AND TENNESSEE.



BOUNDARY BETWEEN NORTH CAROLINA AND TENNESSEE



BOUNDARY BETWEEN NORTH CAROLINA AND TENNESSEE.

charter of King Charles, are the right and property of this State." But it appears from the operations of the United States Coast Survey at both ends of the line that the point of beginning on Currituck Inlet, instead of being, as so constantly assumed, in latitude 36° 30′, or as determined by the surveyors in 1728, 36° 31′ is 36° 33′ 15″, and the western end (of "the Walker line," of 1779, at Bristol, Tenn.) 36° 34′ 25.5″. It is stated in Byrd's Journal that the variation of the compass was ascertained to be a little less than 3° W. [The magnetic chart of the United States Coast Survey would make it 3° E.] And no account is given of any subsequent correction, and if none was made at the end of the line surveyed by him the course would have been in error by nearly 3°, as the amount of variation in this State changes a little more than 1° for every 100 miles of easting or westing. So that the northern boundary of the State as run is not only not the parallel of 36° 30′, but is far from coincident with any parallel of latitude, and must be a succession of curves, with their concavities northward and connected at their ends by north and south offsets.

The southern boundary between this State and South Carolina and Georgia was first established by a joint colonial commission in 1735 to 1746. The commissioners run a line from Goat Island on the coast (in latitude 33° 56′ as supposed) NW to the parallel of 35°, according to their observations, and then due west to within a few miles of the Catawba River, and here, at the old Salisbury and Charleston road, turned north along that road to the southeast corner of the Catawba Indian Lands. This line, resurveyed in 1764, was afterwards (in 1772) continued along the eastern and northern boundaries of the Catawba lands to the point where the latter intersects the Catawba River; thence along and up that river to the mouth of the South Fork of the Catawba, and thence due west, as supposed, to a point near the Blue Ridge. This part of the line was resurveyed and confirmed by commissioners under acts of assembly of 1803, 1804, 1806, 1813, 1814, and 1815, and continued west to and along the Saluda Mountains and the Blue Ridge to the intersection of the "Cherokee boundary" of 1797, and thence in a direct line to the Chatooga River at its intersection with the parallel of 35°. From this point the line was run west to the Tennessee line, between this State and Georgia, in 1807, and confirmed and established by act of 1819.

The boundary between this State and Tennessee was run, according to the course designated in the act of 1789, entitled "An act for the purpose of ceding to the United States certain western lands therein described" (the State of Tennessee); that is, along the crest of the Smoky Mountains, from the Virginia line to the Cataluche River (in Haywood County), in 1799, under act of 1796. It was continued from this point to the Georgia line in 1821. The commissioners who completed this line, at the date last-mentioned, instead of following their instructions, diverged from the crest of the Smoky (Unaka) Mountains at the intersection of the Hiwassee turnpike, and run *due south* to the Georgia line, thereby losing for the State the valuable mining region since known as Ducktown.

And as to the southern boundary, the point of beginning on Goat Island is in latitude 33° 51′ 37″, as shown by the Coast Survey, and instead of running from Goat Island northwest to latitude of 35° and thence along that parallel, it appears, from the South Carolina Geographical State Survey of 1821–'25, that the course from the starting point is N. 47° 30′ W., and instead of pursuing the parallel of 35° it turns west about 10 miles south of that line, and then on approaching the Catawba River, turns northward pursuing a zigzag line to the forks of the Catawba River, which is about 12 miles north of that parallel; and from this point to the mountains the boundary line (of 1772) runs, not west, but N. 88° W., bringing its western end about 17 miles too far north, and reaching the (supposed) parallel of 35° at a distance of about 130 miles east of the Catawba River. The loss of territory resulting from these singular deviations is probably between 500 and 1,000 square miles.

The following extract from the constitution of 1796, of Tennessee, defines the eastern boundary of that State, which is the western boundary of North Carolina, as it was intended to be run and marked:

> Beginning on the extreme height of the Stone Mountain at the place where the line of Virginia intersects it in latitude thirty-six degrees and thirty minutes north; running thence along the extreme height of the said mountain to the place where Watauga River breaks through it; thence a direct course to the top of the Yellow Mountain, where Bright's road crosses the same; thence along the ridge of said mountain between the waters of Doe River and the waters of Rock Creek, to the place where the road crosses the Iron Mountain; from thence along the extreme height of said mountain to where Nolichucky River runs through the same; thence to the top of the Bald Mountain; thence along the extreme height of said mountain to the Painted Rock on French Broad River; thence along the highest ridge of said mountain to the place where it is called the Great Iron or Smoky Mountain; thence along the extreme height of said mountain to the place where it is called Unicoi or Unaka Mountain between the Indian towns of Cowee and Old Chota; thence along the main ridge of the said mountain to the southern boundary of this State as described in the act of cession of North Carolina to the United States of America.

In 1879 the legislature passed an act to appoint commissioners to make a survey from the northeast corner of Georgia westward. This point of commencement is common to North Carolina, South Carolina, and Georgia.

In 1881 the legislature passed another act, providing for the appointment of a commissioner, who should act with commissioners from Virginia, South Carolina, Georgia, or Tennessee, to re-run and re-mark the boundaries between North Carolina and the other States.

SOUTH CAROLINA.

The territory included in the present State of South Carolina was included in the charter of Carolina, which also embraced what is now the State of Georgia. (*Vide* North Carolina, p. 99.)

In 1729 the province of Carolina was divided, forming the two provinces of North Carolina and South Carolina. In 1732 the extent of South Carolina was reduced by the charter of Georgia. (*Vide* Georgia, p. 103.)

(For a history of the settlement of the boundary between North Carolina and South Carolina, *vide* North Carolina, p. 99.)

By the charter of Georgia the line between South Carolina and Georgia was to be the Savannah River, to the head thereof. In 1762 difficulties having arisen, concerning the interpretation of the charter, as regarded the head of the Savannah, and also the title to the lands south of the Altamaha River, Georgia made complaint to the King, who issued a proclamation in 1763 giving the lands between the Altamaha and Saint Mary's Rivers to Georgia. The question of the boundary on the Savannah, however, remained unsettled until 1787, when a convention between the two States was held at Beaufort, S. C., to determine the same, and the line was fixed as at present.

The following is an extract from the articles of agreement:

> The most northern branch or stream of the river Savannah from the sea or mouth of such stream to the fork or confluence of the rivers now called Tugaloo and Keowa, and from thence the most northern branch or stream of the said river Tugaloo till it intersects the northern boundary line of South Carolina, if the said branch or stream of Tugaloo extends so far north, reserving all the islands in the said rivers Savannah and Tugaloo to Georgia; but if the head spring or source of any branch or stream of the said river Tugaloo does not extend to the north boundary line of South Carolina, then a west line to the Mississippi, to be drawn from the head spring or source of the said branch or stream of Tugaloo River which extends to the highest northern latitude, shall forever hereafter form the separation, limit, and boundary between the States of South Carolina and Georgia. (Laws of the United States, Vol. I, p. 466.)

In the same year South Carolina ceded to the United States a narrow strip of territory south of the North Carolina line, which she claimed, about 12 or 14 miles wide, and extending to the Mississippi River; this strip now forms the northern portion of Georgia, Alabama, and Mississippi. Georgia being thus increased in extent northwardly, the line between the two States is clearly expressed in the code of South Carolina, as follows, viz:

> The Savannah River, from its entrance into the ocean to the confluence of the Tugaloo and Keowa Rivers; thence by the Tugaloo River to the confluence of the Tugaloo and Chatooga Rivers; thence by the Chatooga River to the North Carolina line in the thirty-fifth degree of north latitude, the line being low-water mark at the southern shore of the most northern stream of said rivers, where the middle of the rivers is broken by islands, and middle thread of the stream where the rivers flow in one stream or volume.

GEORGIA.

Georgia was included in the proprietary charter granted to the lords proprietors of Carolina in 1663 and 1665, for which a provincial charter was substituted in 1719.

In 1732 the charter of Georgia as an independent colony was granted by King George II, of which the following is an extract:

> All those lands, countrys, and territories situate, lying and being in that part of South Carolina, in America, which lies from the most northern part of a stream or river there, commonly called the Savannah, all along the sea-coast to the southward, unto the most southern stream of a certain other great water or river called the Altamaha, and westerly from the heads of the said rivers, respectively, in direct lines to the south seas.

This charter was surrendered in 1752 and a provincial government established. (C. & C., p. 369 *et seq.*)

In 1763 the territory between the Altamaha and Saint Mary's Rivers was added to Georgia by royal proclamation. (*Vide* South Carolina, p. 102.)

In the constitution adopted by Georgia in 1798 the boundaries are declared. The following is an extract therefrom:

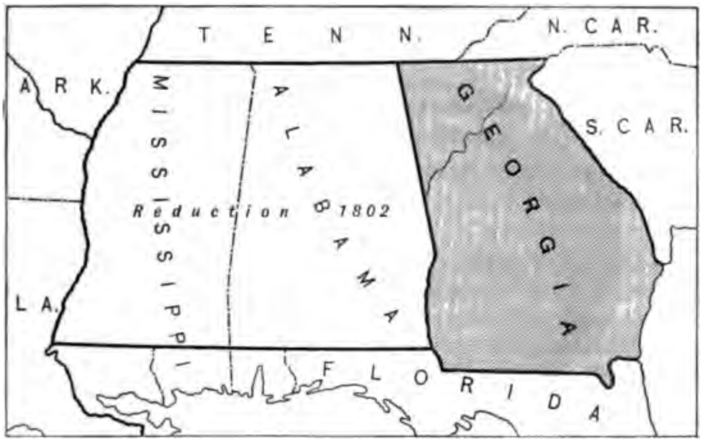
> The limits, boundaries, jurisdictions, and authority of the State of Georgia do, and did, and of right ought to extend from the sea or mouth of the river Savannah along the northern branch or stream thereof, to the fork or confluence of the rivers now called Tugalo and Keowee, and from thence along the most northern branch or stream of the said river Tugalo, till it intersect the northern boundary line of South Carolina, if the said branch or stream of Tugalo extends so far north, reserving all the islands in the said rivers Savannah and Tugalo to Georgia; but if the head, spring, or source of any branch or stream of the said river Tugalo does not extend to the north boundary line of South Carolina, then a west line to the Mississippi, to be drawn from the head, spring, or source of the said branch or stream of Tugalo River, which extends to the highest northern latitude; thence down the middle of the said river Mississippi, until it shall intersect the northernmost part of the thirty-first degree of north latitude, south by a line drawn due east from the termination of the line last mentioned, in the latitude of thirty-one degrees north of the equator, to the middle of the river Apalachicola or Chatahoochee; thence along the middle thereof, to its junction with Flint River; thence straight to the head of Saint Mary's River, and thence, along the middle of Saint Mary's River, to the Atlantic Ocean, and from thence to the mouth or inlet of Savannah River, the place of beginning, including and comprehending all the lands and waters within the said limits, boundaries, and jurisdictional rights; and also all the islands within twenty leagues of the sea-coast.

In 1802 Georgia entered into articles of agreement and cession with the United States, whereby Georgia ceded to the United States the lands west of her present boundaries, and the United States ceded to Georgia that part of the South Carolina cession of 1787 which lies east of the present western boundary of Georgia. The following extracts show the limits of the two cessions:

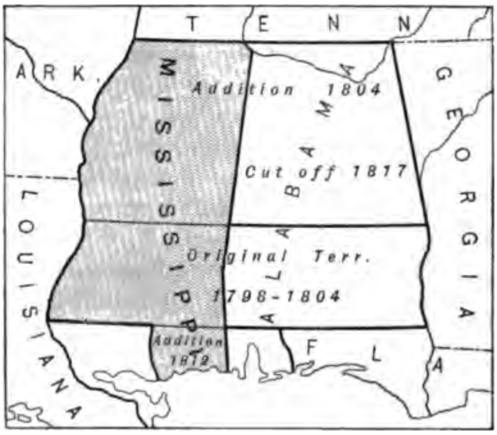
> The State of Georgia cedes to the United States all the right, title, and claim which the said State has to the jurisdiction and soil of the lands situated within the boundaries of the United States, south of the State of Tennessee and west of a line beginning on the western bank of the Chatahouchee River where the same crosses the boundary line between the United States and Spain; running thence up the said river Chatahouchee, and along the western bank thereof to the great bend thereof, next above the place where a certain creek or river, called "Uchee" (being the first considerable stream on the western side, above the Cussetas and Coweta towns), empties into the said Chatahouchee River; thence in a direct line to Nickajack, on the Tennessee River; thence crossing the said last-mentioned river, and thence running up the said Tennessee River and along the western bank thereof to the southern boundary line of the State of Tennessee.
>
> * * * * * * *
>
> The United States * * * cede to the State of Georgia * * * the lands * * * situated south of the southern boundaries of the States of Tennessee, North Carolina, and South Carolina, and east of the boundary line herein above described as the eastern boundary of the territory ceded by Georgia to the United States.

For a history of the boundary between Georgia and South Carolina, *vide* South Carolina, p. 102.

The history of the boundary between North Carolina and Georgia has already been given (*vide* North Carolina, p. 101). It may be proper, however, to add that this line (the thirty-fifth degree of north latitude) was fixed by the cession above detailed, from the United States to Georgia



HISTORICAL DIAGRAM OF GEORGIA.



HISTORICAL DIAGRAM OF MISSISSIPPI.

of that part of the South Carolina cession east of the present western boundary of Georgia.

A long controversy ensued between Georgia and North Carolina, with no results, however, until in 1810 Georgia empowered her governor to employ Mr. Andrew Ellicott to ascertain the true location of the thirty-fifth degree of latitude. Ellicott did so, and the point fixed by him was acquiesced in. (*Vide* Cobb's Georgia Digest, p. 150.)

The boundary between Georgia and Tennessee was established in 1818, and is as follows, viz: The thirty-fifth parallel of north latitude, beginning and ending as follows:

Beginning at a point in the true parallel of the thirty-fifth degree of north latitude, as found by James Cormack, mathematician on the part of the State of Georgia, and James S. Gaines, mathematician on the part of the State of Tennessee, on a rock about two feet high, four inches thick, and fifteen inches broad, engraved on the north side thus: "June 1st, 1818; var. 6¾ east," and on the south side thus: "Geo. 35 North; J. Cormack," which rock stands one mile and twenty-eight poles from the south bank of the Tennessee River, due south from near the center of the old Indian town of Nickajack, and near the top of the Nickajack Mountain, at the supposed corner of the State of Georgia and Alabama; thence running due east, leaving old D. Ross two miles and eighteen yards in the State of Tennessee, and leaving the house of John Ross about two hundred yards in the State of Georgia, and the house of David McNair one mile and one-fourth of a mile in the State of Tennessee, with blazed and mile-marked trees, lessening the variation of the compass by degrees, closing it at the termination of the line on the top of the Unicoi Mountain at five and one-half degrees. (*Vide* C. Stat. of Tenn., pp. 243–244.)

The boundary between Georgia and Florida was fixed by the treaty of 1783, between the United States and Great Britain, substantially as at present, viz: Commencing in the middle of the Apalachicola or Catahouche River, on the thirty-first degree of north latitude; thence along the middle thereof to its junction with the Flint River; thence straight to the head of Saint Mary's River, and thence down along the middle of Saint Mary's River to the Atlantic ocean (*vide* Treaty of 1783). This boundary was affirmed by the treaty of 1795 between the United States and Spain, and commissioners were appointed to run the entire line between the United States and the Spanish territory. (*Vide* Treaty of 1795.)

In 1819 Spain ceded the Floridas to the United States. In 1822 Florida was made a Territory and in 1825 was admitted into the Union as an independent State.

In 1826 Congress took action as indicated below:

UNITED STATES STATUTES AT LARGE, NINETEENTH CONGRESS, SESSION I, 1826.

AN ACT to authorize the President of the United States to run and mark a line dividing the Territory of Florida from the State of Georgia.

The line shall be run straight from the junction of said rivers Chatahoochie and Flint, to the point designated as the head of Saint Mary's River.

This boundary line was long unsettled, a controversy arising concerning the true point to be considered to be the head of the Saint Mary's

River, as Georgia contended that the point fixed upon by the Spanish and American commissioners under the treaty of 1795 was incorrect. This line was run in 1825 by the General Land Office.

In 1859 commissioners were appointed by Georgia and Florida to rerun the line. Florida ratified their report in 1861, and Georgia in 1866.

The detailed report of the commissioners is not at hand, but the line is declared in the statutes of Georgia as follows, viz:

> From a point on the western bank of the Chattahoochee River in the 31st degree of north latitude; thence along the line or limit of high-water mark to its junction with the Flint River; thence along a certain line of survey made by Gustavus J. Orr, a surveyor on the part of Georgia, and W. Whitner, a surveyor on the part of Florida, beginning at a four-and-aft tree, about four chains below the present junction; thence along this line east, to a point designated thirty-seven links north of Ellicott's Mound on the St. Mary's River; thence along the middle of said river to the Atlantic Ocean. (*Vide* Code of Ga., 1873, p. 7.)

This line is also given in the code of Florida, and differs in one respect, viz, from the thirty-first degree of north latitude down the middle of said river to its confluence with the Flint River, etc. (*Vide* Code of Florida, 1872.)

The line between Georgia and Alabama was fixed by the act of cession of Georgia to the United States in 1802.

In 1822–'25, Georgia desiring to have the line run from the Chattahoochee to where it strikes the Tennessee line, appointed commissioners for that purpose, and requested the co-operation of Alabama and the United States, both, however, failing to take action. The Georgia commissioners ran the line from Nickajack, on the Tennessee line, to Miller's Bend, on the Chattahoochee. (For a history of the controversy concerning this line, *vide* laws of Georgia, 1822–'24–'25–'26.)

Alabama protested against the above line and made repeated efforts to reopen negotiations concerning it, to all of which Georgia sturdily refused to accede, until finally, January 24, 1840, the legislature of Alabama passed the following joint resolution, viz:

> *Resolved*, That the State of Alabama will, and do, hereby accept, as the true dividing line between this State and that of Georgia, the line which was run and marked out by the commissioners of Georgia in 1826, beginning at what is called Miller's Bend, on the Chattahoochee River; thence along said marked line to Nickajack.

The line is given in the code of Alabama in the following words, viz:

> The boundary line between Alabama and Georgia commences on the west side of the Chattahoochee River at the point where it enters the State of Florida; from thence up the river, along the western bank thereof, to the point on Miller's Bend next above the place where the Uchee Creek empties into such river; thence in a direct line to Nickajack. (See code of Alabama, 1876, p. 189.)

In James's Hand-book of Georgia, 1876, p. 121, is the following description of the western boundary of Georgia, viz:

> From Nickajack the line between Georgia and Alabama runs south 9° 30′ east to Miller's Bend, on the Chattahoochee River, about 146 miles; thence down the western bank of the river at high-water mark to its junction with Flint River, at a point now four chains below the actual junction, latitude 30° 42′ 42″, longitude 80° 53′ 15″.

FLORIDA.

Florida was originally settled by the Spaniards, and was held as a Spanish province nearly two hundred years. In 1762 it was ceded by Spain to Great Britain, who divided it into the two provinces of East and West Florida, separated by the Apalachicola River, with a northern boundary substantially as at present. (*Vide* Fairbanks' History of Florida.)

In 1783 Great Britain retroceded Florida to Spain, and the northern boundary was fixed by the treaty of peace between the United States and Great Britain signed in the same year. Spain, however, claimed the territory as far north as the parallel of latitude of the mouth of the Yazoo River.

Previous to this, in 1763, France had ceded Louisiana to Spain, which Spain retroceded to France in 1800, and in 1803 France ceded the same to the United States, who claimed that the eastern boundary of the said province of Louisiana, so often ceded, was the Perdido River, while Spain claimed it to be the Iberville River and Lakes Maurepas and Pontchartrain. The controversy arising from the difference of interpretation of these various treaties and cessions was terminated by the treaty of Washington in 1819, whereby Spain ceded to the United States the provinces of East and West Florida.

On March 30, 1822, by an act of Congress, the territory ceded to the United States by Spain was made the "Territory of Florida," embracing the same extent as does the present State.

On March 3, 1845, Florida was admitted into the Union as an independent State.

(For a history of the northern boundary of Florida *vide* Georgia, p. 105.)

In 1831 Congress passed an act relating to the boundary between Florida and Alabama, of which the following is an extract:

AN ACT to ascertain and mark the line between the State of Alabama and the Territory of Florida, and the northern boundary of the State of Illinois, and for other purposes.

That the President of the United States be, and he is hereby, authorized to cause to be run and marked the boundary line between the State of Alabama and the Territory of Florida, by the surveyors-general of Alabama and Florida, on the thirty-first degree of north latitude.

* * * * * * *

(*Vide* U. S. Stat. at Large, Vol. IV, p. 479.)

In 1847 the agreement of commissioners previously appointed by Florida and Alabama was ratified, and the line is described as follows, viz:

Commencing on the Chattahoochee River near a place known as "Irwin's Mills" and running west to the Perdido, marked throughout by blazes on the trees, and also by mounds of earth thrown up on the line at distances of one mile, more or less, from each other, and commonly known as "Ellicott's Line," or the "Mound Line." (*Vide* Florida Code, 1873, p. 100.)

This line was run in 1799–1800 by A. Ellicott. The line was retraced, remeasured, and marked in 1853–54.

Tennessee passed an act establishing "Thompson's line." The details of "Thompson's line" have not been found. In 1837 the line was again run by commissioners from the two States, and ratified by the legislatures. The commissioners' report was as follows, viz:

> Commencing at a point on the west bank of the Tennessee River six four-pole chains south, or above the mouth of Yellow Creek, and about three-quarters of a mile north of the line known as "Thompson's line," and twenty-six chains and ten links north of Thompson's line at the basis meridian of the Chickasaw surveys, and terminating at a point on the east bank of the Mississippi River (opposite Cow Island) sixteen chains north of Thompson's line. (See Laws of Tennessee, 1837, p. 27.)

The boundaries were fixed by the act of Congress admitting the State of Mississippi, as follows, viz:

> Commencing at the most eastern junction of Pearl River with Lake Borgne, thence up said Pearl River to the thirty-first degree of north latitude, thence west along said degree of latitude to the Mississippi River, thence up the same to the point where the southern boundary of Tennessee strikes the same. (See U. S. Laws, vol. 6, p. 175.)

Mississippi claims to the middle of the Mississippi River, where the river forms her western boundary. (See Rev. Stat., 1857.)

LOUISIANA.

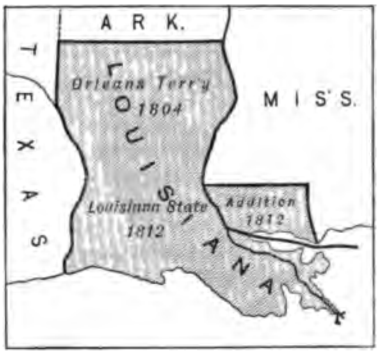
The original territory of Louisiana was acquired from France (see p. 21). In 1804, a portion of this, comprising the area of the present State of Louisiana, with the exception of the southeastern portion immediately adjoining the present State of Florida, was organized into a territory under the name of Orleans, while the balance of the Louisiana purchase retained the name of Louisiana Territory. On April 30, 1812, the Territory of Orleans was admitted as a State under the name of Louisiana, and at the same time the name of the Territory of Louisiana was changed to Missouri Territory. In the same year the limits of the State were enlarged in the southeast to its present boundaries.

The following act defines the Territory of Orleans:

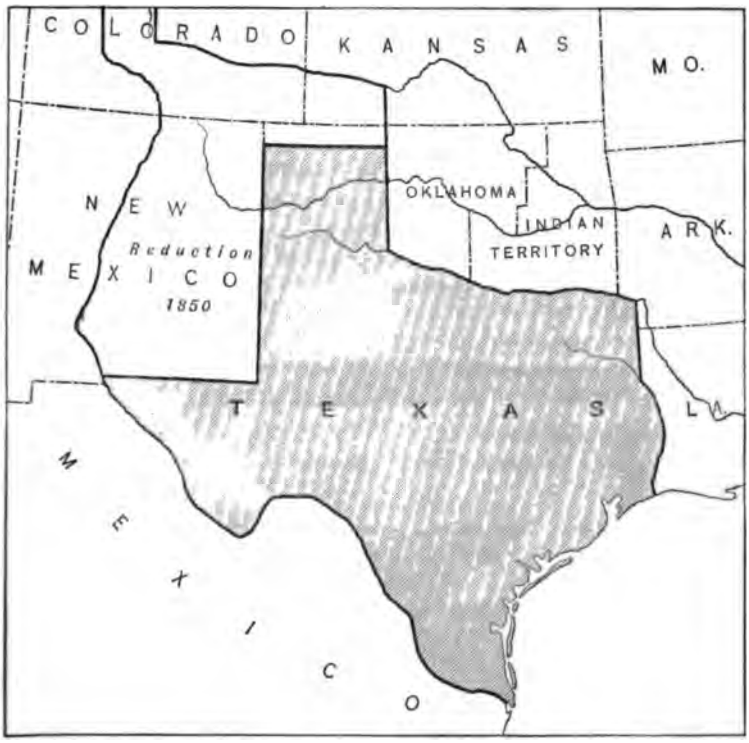
> All that portion of country ceded by France to the United States, under the name of Louisiana, which lies south of the Mississippi territory, and of an east and west line to commence on the Mississippi River at the thirty-third degree of north latitude, and to extend west to the western boundary of the said cession, shall constitute a Territory of the United States, under the name of the Territory of Orleans. (Eighth Congress, first session.)

The following clause from the act admitting Louisiana defines its original boundaries:

> Beginning at the mouth of the river Sabine, thence by a line to be drawn along the middle of said river, including all islands, to the thirty-second degree of latitude; thence due north to the northernmost part of the thirty-third degree of north latitude; thence along the said parallel of latitude to the river Mississippi; thence down



HISTORICAL DIAGRAM OF LOUISIANA.



HISTORICAL DIAGRAM OF TEXAS.

the said river to the river Iberville; and from thence along the middle of the said river and lakes Maurepas and Pontchartrain to the Gulf of Mexico; thence, bounded by the said Gulf, to the place of beginning, including all islands within three leagues of the coast. (Twelfth Congress, first session.)

The following is a description of the addition to the State of Louisiana, in terms of the act:

Beginning at the Junction of the Iberville with the river Mississippi, thence along the middle of the Iberville, the river Amite, and of the lakes Maurepas and Pontchartrain, to the eastern mouth of the Pearl River; thence up the eastern branch of Pearl River to the thirty-first degree of north latitude; thence along the said degree of latitude to the river Mississippi; thence down the said river to the place of beginning, shall become and form a part of the State of Louisiana. (Twelfth Congress, first session.)

The north boundary of Louisiana was surveyed by a joint commission of the State and the United States.

TEXAS.

Texas declared its independence of Mexico in 1835. On December 29, 1845, it was admitted to the Union. As originally constituted, it embraced besides its present area the region east of the Rio Grande, now in New Mexico, extending north to the forty-second parallel, its eastern limits coinciding with the western limit of the United States, as laid down in the treaty with Spain of 1819. (See "Texas accession," p. 24.)

In 1848, the eastern boundary of the State was extended slightly, as noted in the following act:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Congress consents that the legislature of the State of Texas, may extend her eastern boundary so as to include within her limits one-half of Sabine Pass, one-half of Sabine Lake, also one-half of Sabine River, from its mouth as far north as the thirty-second degree of north latitude.

In 1850, the State sold to the General Government for the sum of $10,000,000, that part lying north of the parallel of 36° 30′, and that portion lying west of longitude 103°, as far south as the parallel of 32°, as set forth in the following clause from the act of Congress relating to this transfer:

First. The State of Texas will agree that her boundary on the north shall commence at the point at which the meridian of one hundred degrees west from Greenwich is intersected by the parallel of thirty-six degrees thirty minutes north latitude, and shall run from said point due west to the meridian of one hundred and three degrees west from Greenwich; thence her boundary shall run due south to the thirty-second degree of north latitude; thence on the said parallel of thirty-two degrees of north latitude to the Rio Bravo del Norte, and thence with the channel of said river to the Gulf of Mexico. (Thirty-first Congress, first session.)

The following act defines the northern boundary of Texas:

AN ACT to authorize the President of the United States, in conjunction with the State of Texas, to run and mark the boundary lines between the Territories of the United States and the State of Texas.

Beginning at the point where the one hundredth degree of longitude west from Greenwich crosses Red River, and running thence north to the point where said one hundredth degree of longitude intersects the parallel of thirty-six degrees thirty minutes north latitude, and thence west with the said parallel of thirty-six degrees and thirty minutes north latitude to the point where it intersects the one hundred and third degree of longitude west from Greenwich; and thence south with the said one hundred and third degree of longitude to the thirty-second parallel of north latitude; and thence west with said thirty-second degree of north latitude to the Rio Grande. (Thirty-fifth Cong., first session.)

The boundary line of Texas is as follows: Beginning in the Gulf of Mexico, at the outlet of Sabine Lake, the line passes northward through the middle of Sabine Lake and up the middle of Sabine River to the point where said river intersects the parallel of 32°; thence north along the meridian of that point of intersection to the point where said meridian intersects Red River; thence up Red River to the one hundredth meridian west of Greenwich; thence north on said meridian to the parallel of 36° 30′; west on said parallel to the meridian of 103° west of Greenwich; thence south on said meridian to the parallel of latitude of 32°; thence west on that parallel to its point of intersection with the Rio Grande; thence down the mid-channel of the Rio Grande to its mouth.

That portion of the east boundary between Red River and the Sabine was run and marked by a joint commission of the United States and Texas in 1841.

The boundary lines between Texas and New Mexico were run and marked in 1859–60, under the Department of the Interior.

ARKANSAS.

The Territory of Arkansas, or Arkansaw, as it was originally spelled, was formed on March 2, 1819, from a part of Missouri Territory. The following clause from the act establishing it defines its limits in part:

All that part of the Territory of Missouri which lies south of a line beginning on the Mississippi River at thirty-six degrees north latitude, running thence west to the river St. François, thence up the same to thirty-six degrees thirty minutes north latitude, and thence west to the western Territorial boundary line, shall, for the purposes of a Territorial government, constitute a separate Territory and be called the Arkansaw Territory.

In 1824 an act was passed by Congress fixing the western boundary of the Territory. This was as follows:

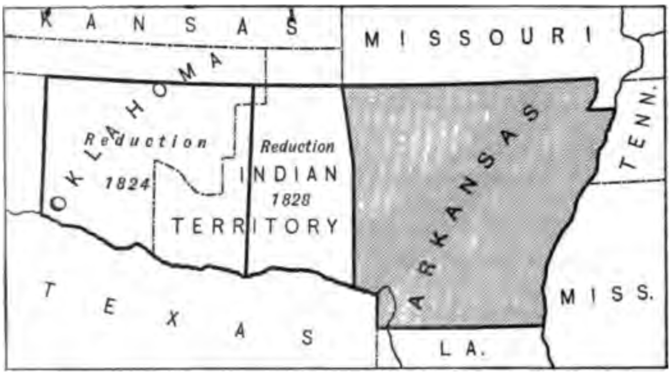
AN ACT to fix the western boundary line of the Territory of Arkansas, and for other purposes.

The western boundary line of the Territory of Arkansas shall begin at a point forty miles west of the southwest corner of the State of Missouri and run south to the right bank of the Red River, and thence down the river and with the Mexican boundary to the line of the State of Louisiana.

Four years later, in 1828, the following act was passed defining its southern boundary:

AN ACT to authorize the President of the United States to run and mark a line dividing the Territory of Arkansas from the State of Louisiana.

Commencing on the right bank of the Mississippi River at latitude thirty-three degrees north and running due west on that parallel of latitude to where a line running due north from latitude thirty-two degrees north on the Sabine River will intersect the same.



HISTORICAL DIAGRAM OF ARKANSAS.

HISTORICAL DIAGRAM OF OHIO.

The south boundary was originally run in 1823, and again in 1843–45, by a joint commission of the two States of Arkansas and Missouri.

The same year the following treaty changed materially the western line of the Territory, placing it in its present position:

TREATY WITH THE CHEROKEE INDIANS MAY 28, 1828.

ARTICLE 1. The western boundary of Arkansas shall be, and the same is, hereby defined, viz: A line shall be run, commencing on Red River at the point where the Eastern Choctaw line strikes said river, and run due north with said line to the river Arkansas; thence in a line to the southwest corner of Missouri.

The Eastern Choctaw line, referred to above, starts on the Arkansas River "one hundred paces west of Fort Smith, and thence due south to the Red River." (Treaty with Choctaw Nation, January 20, 1825.)

This part of the west boundary was run and marked in 1825, and that part from Fort Smith to the southwestern corner of Missouri in 1831. The entire western boundary was resurveyed and re-marked in 1877.

Arkansas was admitted as a State June 15, 1836.

The following extracts from the enabling act, and from various constitutions, give statements of the boundaries, differing slightly from one another, but, for the most part, only in wording:

CONSTITUTION OF ARKANSAS, 1836.

Beginning in the middle of the main channel of the Mississippi River on the parallel of 36 degrees north latitude; running from thence west with the parallel of latitude to the Saint Francis River; thence up the middle of the main channel of said river to the parallel of thirty-six degrees thirty minutes north; from thence west to the southwest corner of the State of Missouri; and from thence to be bounded on the west to the north bank of Red River, as by acts of Congress and treaties heretofore defining the western limits of the Territory of Arkansas, and to be bounded on the south side of Red River by the Mexican boundary line to the northwest corner of the State of Louisiana; thence east by the Louisiana State line to the middle of the main channel of the Mississippi River; thence up the middle of the main channel of said river to the thirty-sixth degree of north latitude, the point of beginning.

Again, in the enabling act for Arkansas, 1836 (Twenty-fourth Congress, first session), the boundaries are found to be defined as follows:

Beginning in the middle of the main channel of the Mississippi River, on the parallel of thirty-six degrees north latitude, running from thence west, with the said parallel of latitude, to the St. Francis River; thence up the middle of the main channel of said river to the parallel of thirty-six degrees thirty minutes north; from thence west to the southwest corner of the State of Missouri; and from thence to be bounded on the west, to the north bank of Red River, by the line described in the first article of the treaty between the United States and the Cherokee Nation of Indians, west of the Mississippi, made and concluded at the city of Washington, on the twenty-sixth day of May, in the year of our Lord one thousand eight hundred and twenty-eight; and to be bounded on the south side of Red river by the Mexican boundary line to the northwest corner of the State of Louisiana; thence east with the Louisiana State line to the middle of the main channel of the Mississippi River; thence up the middle of the main channel of the said river to the thirty-sixth degree of north latitude, the point of beginning.

In the constitution of 1864 the boundaries are defined as follows:

> Beginning in the middle of the Mississippi River, on the parallel of thirty-six degrees north latitude, to the St. Francis River; thence up the middle of the main channel of said river to the parallel of thirty-six degrees thirty minutes north, thence west to the southwest corner of the State of Missouri; and from thence to be bounded on the west to the north bank of Red River, as by acts of Congress of the United States, and the treaties heretofore defining the western limits of the Territory of Arkansas; and to be bounded on the south side of Red River by the boundary line of the State of Texas, to the northwest corner of the State of Louisiana; thence east with the Louisiana State line to the middle of the main channel of the Mississippi River; thence up the middle of the main channel of said river to the thirty-sixth degree of north latitude, the point of beginning.

The constitution of 1868 differs but slightly from the last. It is as follows:

> Beginning at the middle of the main channel of the Mississippi River, on the parallel of 36° north latitude, running from thence west, with the said parallel of latitude, to the Saint Francis River; thence up the middle of the main channel of said river to the parallel of 36° 30′ north; from thence west with the boundary line of the State of Missouri to the southwest corner of that State; and thence to be bounded on the west to the north bank of Red River, as by acts of Congress and treaties heretofore defining the western limits of the Territory of Arkansas; and to be bounded on the south side of Red River by the boundary line of the State of Texas to the northwest corner of the State of Louisiana; thence east with the Louisiana State line to the middle of the main channel of the Mississippi River; thence up the middle of the main channel of said river, including an island in said river known as "Belle Point Island," to the 36° of north latitude, the place of beginning.

In the constitution of 1874 there are again slight differences, mainly in wording.

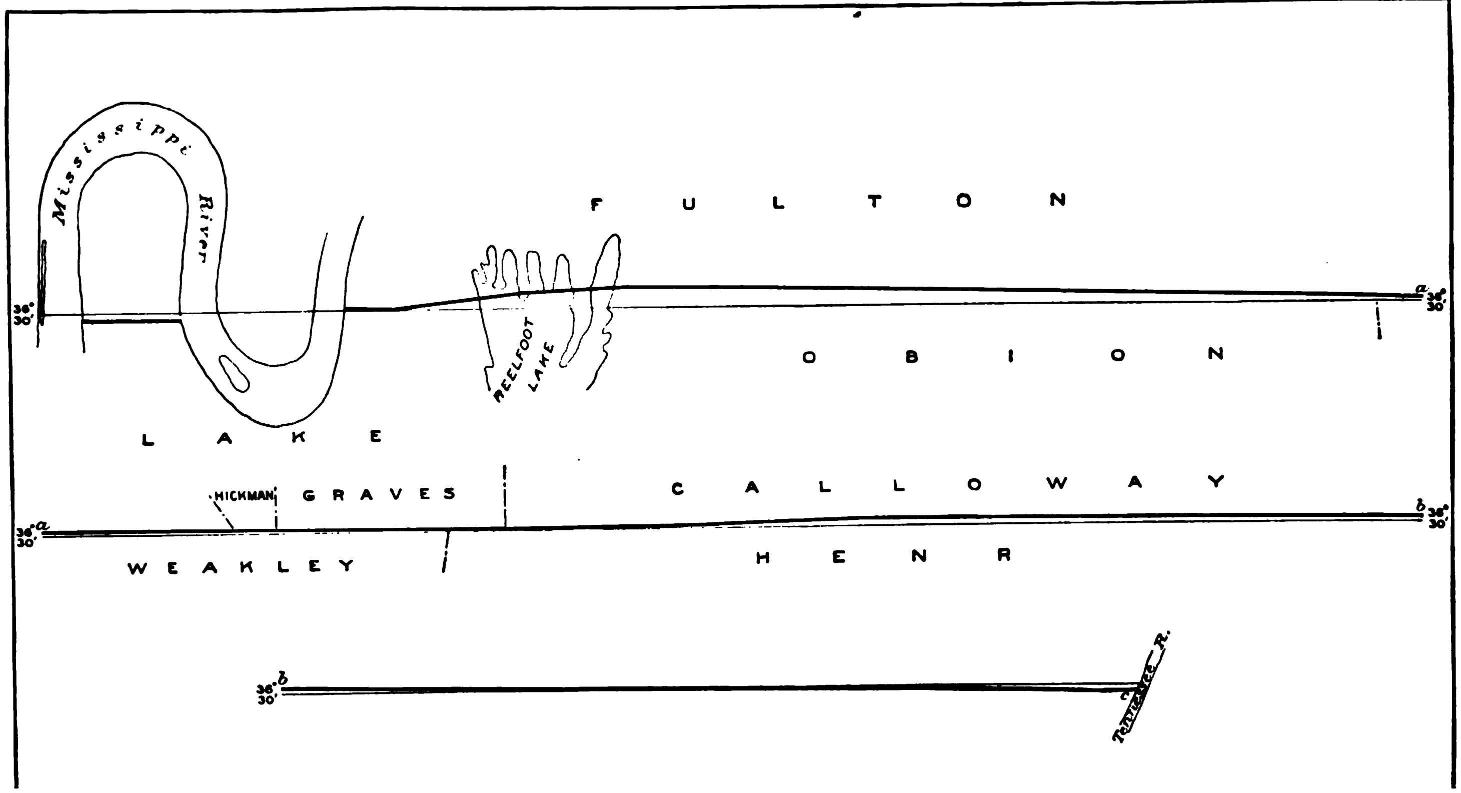
> Beginning at the middle of the main channel of the Mississippi River, on the parallel of thirty-six degrees of north latitude; running thence west with said parallel of latitude to the middle of the main channel of the Saint Francis River; thence up the main channel of said last-named river to the parallel of thirty-six degrees thirty minutes of north latitude; thence west with the southern boundary line of the State of Missouri to the southwest corner of said last-named State; thence to be bounded on the west to the north bank of Red River, as by act of Congress and treaties existing January 1, 1837, defining the western limits of the Territory of Arkansas and to be bounded across and south of Red River by the boundary line of the State of Texas as far as to the northwest corner of the State of Louisiana; thence easterly with the northern boundary line of said last-named State, to the middle of the main channel of the Mississippi River; thence up the middle of the main channel of said last-named river, including an island in said river known as "Belle Point Island," and all other land originally surveyed and included as a part of the Territory or State of Arkansas to the thirty-sixth degree of north latitude, the place of beginning.

TENNESSEE.

Tennessee was originally a part of North Carolina. (For further information *vide* North Carolina, p. 98.)

In 1790 it was ceded to the United States. Its boundaries described in the act of cession are, substantially, those of the present day.

On June 1, 1796, by an act of Congress it was admitted into the Union. The act of admission declares its boundaries as "All the territory ceded by North Carolina."


Mississippi River
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OBION
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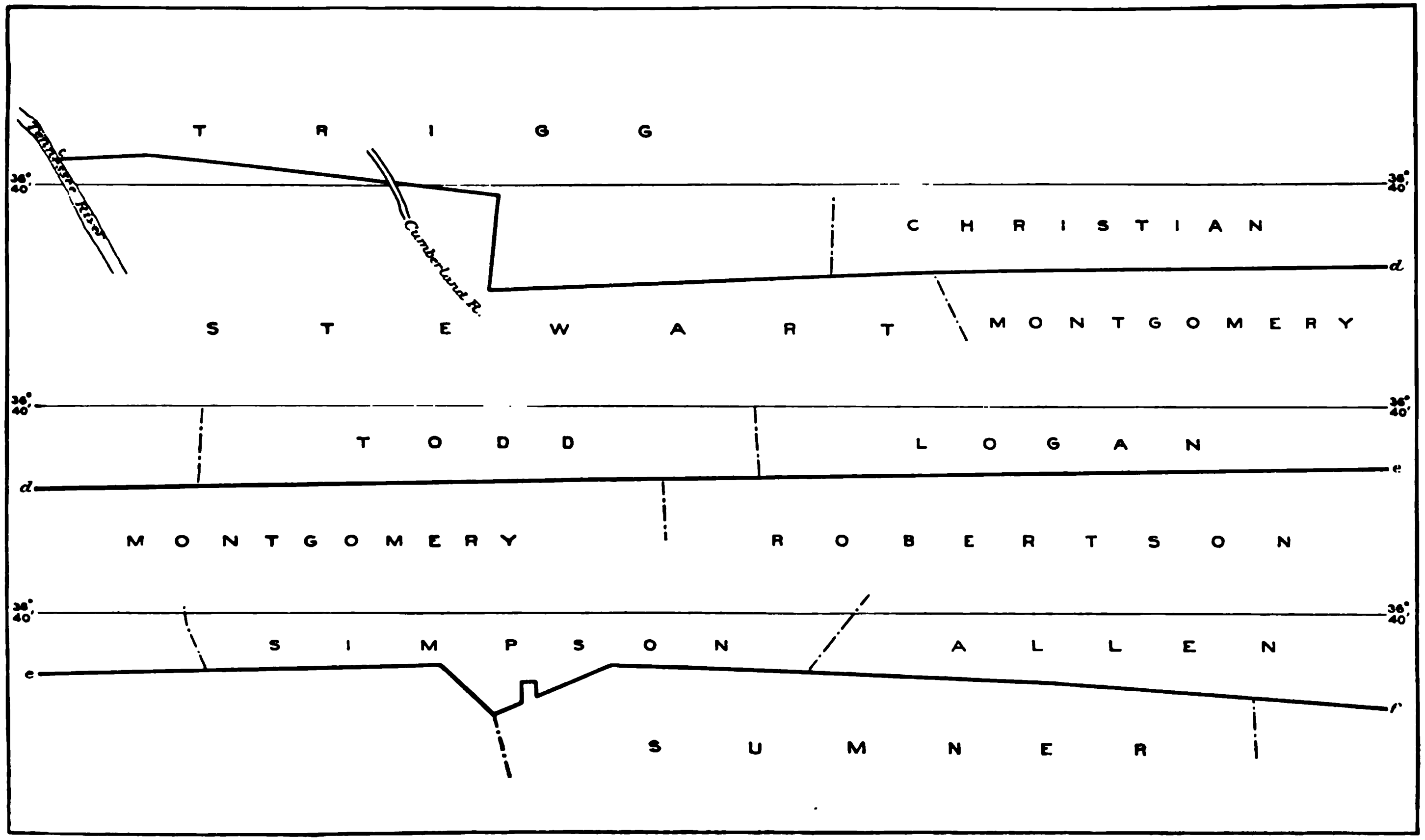
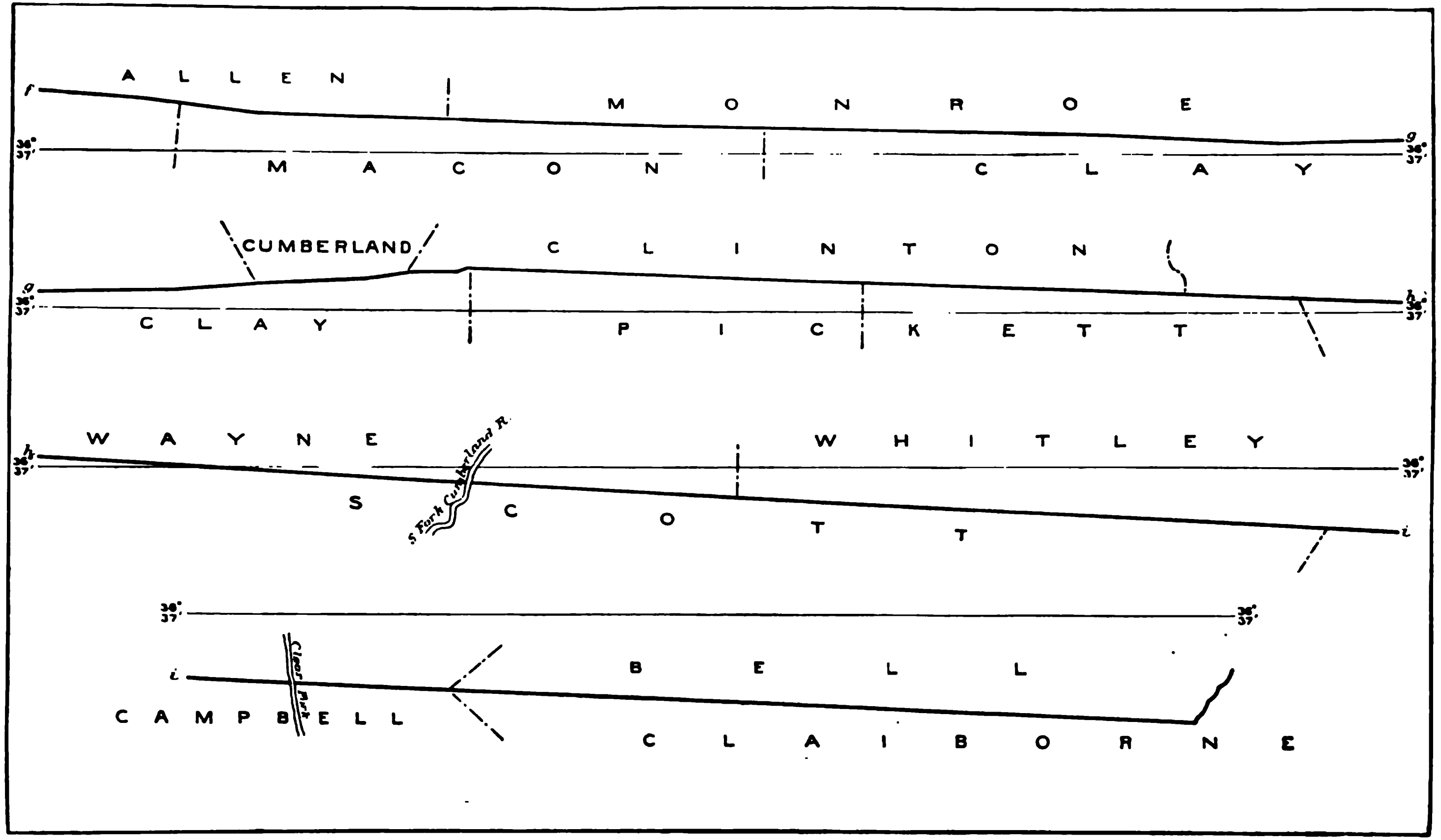


BOUNDARY BETWEEN KENTUCKY AND TENNESSEE.



BOUNDARY BETWEEN KENTUCKY AND TENNESSEE.

(For the history of the eastern boundary, *vide* North Carolina, p. 101; for the southern boundary, *vide* Georgia, p. 105, Alabama, p. 109, and Mississippi, p. 109.)

The Mississippi River forms its western boundary under the treaty of peace of 1783.

The line which divided Virginia and North Carolina was the southern boundary of Kentucky. Virginia and North Carolina, prior to the creation of the States of Kentucky and Tennessee, appointed commissioners, Messrs. Walker and Henderson, to run and mark the line on the parallel of latitude 36° 30′. From a point on the top of the Cumberland Mountains, now the southeastern corner of Kentucky, Walker ran and marked the line to a point on the Tennessee River. This line, called Walker's line, was regarded for many years as the dividing line between Kentucky and Tennessee. It was ascertained, however, that Walker's line was north of latitude 36° 30′.

The Indian title to the land west of the Tennessee River being extinguished by the treaty of 1819, the legislature appointed Robert Alexander and Luke Munsell to ascertain the true point of latitude 36° 30′ on the Mississippi River, and to run and mark a line east on that parallel, which was done as far east as the Tennessee River. (For above, see Gen. Stat. Ky., 1873, p. 167.)

In 1820 commissioners were appointed by Kentucky and Tennessee, respectively, to settle the boundary. Their report was ratified, and is as follows, viz:

> ART. I. The line of boundary and separation between the States of Kentucky and Tennessee shall be as follows, viz:
>
> The line run by the Virginia commissioners in the year 1779–'80, commonly called Walker's line, as the same is reputed, understood, and acted upon by the said States, their respective officers and citizens, from the southeastern corner of Kentucky to the Tennessee River; thence with and up said river to the point where the line of Alexander and Munsell, run by them in the last year under the authority of an act of the legislature of Kentucky entitled "An act to run the boundary line between this State and the State of Tennessee, west of the Tennessee River, approved Feb. 8, 1819," would cross said river, and thence with the said line of Alexander and Munsell, to the termination thereof on the Mississippi River below New Madrid.

Then follow nine other articles.

Article III provides for running and marking the line at any subsequent time. (See General Stat. Kentucky, page 170.)

In 1858–'59 commissioners were appointed by Kentucky and Tennessee to run this line.

The detailed report of the commission on the part of Tennessee can be found in Statutes of Tennessee, 1871, Vol. I, pages 223–243, giving courses, bearings, milestones erected, and a map of the boundary.

The report of this commission on the part of Kentucky was published at Frankfort, by the State Printer, 1860, in a pamphlet of 98 octavo pages, with latitudes and a map of the line, on a scale of 1:108,000.

(For a history of the boundary between Virginia and Tennessee, *vide* Virginia, p. 97.)

KENTUCKY.

Kentucky was included in the original limits of Virginia, and was a part of the county of Augusta. Augusta County was formed in 1738. In 1769 Botetourt County was created from a portion of Augusta County; in 1772, Fincastle from Botetourt; in 1776, Kentucky from Fincastle.

The boundaries of all these counties may be found in Hening's Laws of Virginia, Vols. I to IX.

In 1789 Virginia passed an act giving her consent that the county of Kentucky, within her jurisdiction, should be formed into a new State. Accordingly, June 1, 1792, Kentucky was admitted into the Union, with substantially her present boundaries.

By the cession of 1784, by Virginia to the United States, of the territory northwest of the Ohio River, this river became the northwest boundary of the State of Kentucky.

The western boundary, the Mississippi, was fixed by the treaty of peace in 1783.

(For a history of the boundary between Kentucky and Virginia and West Virginia, *vide* Virginia, p. 96; for the boundary between Kentucky and Tennessee, *vide* Tennessee, p. 115.)

OHIO.

Ohio was the first State formed from the original territory northwest of the river Ohio. It was admitted as a State on November 29, 1802, with limits given in the enabling act as follows:

> Bounded on the east by the Pennsylvania line, on the south by the Ohio River, to the mouth of the Great Miami River, on the west by the line drawn due north from the mouth of the Great Miami aforesaid, and on the north by an east and west line drawn through the southerly extreme of Lake Michigan, running east after intersecting the due-north line aforesaid, from the mouth of the Great Miami until it shall intersect Lake Erie or the territorial line; and thence with the same through Lake Erie to the Pennsylvania line aforesaid: *Provided*, That Congress shall be at liberty at any time hereafter either to attach all the territory lying east of the line to be drawn due north from the mouth of the Miami aforesaid to the territorial line, and north of an east and west line drawn through the southerly extreme of Lake Michigan, running east as aforesaid to Lake Erie, to the aforesaid State, or dispose of it otherwise, in conformity to the fifth article of compact between the original States and the people and States to be formed in the territory northwest of the river Ohio. (Seventh Congress, first session.)

In the constitution of Ohio of 1802, Article VII, the boundaries are defined as follows:

> Bounded on the east by the Pennsylvania line; on the south by the Ohio River, to the mouth of the Great Miami River; on the west by the line drawn due north from the mouth of the Great Miami aforesaid; and on the north by an east and west line drawn through the southerly extreme of Lake Michigan, running east after intersecting the due-north line aforesaid from the mouth of the Great Miami, until it shall intersect Lake Erie or the territorial line; and thence with the same through Lake Erie to the Pennsylvania line aforesaid; provided always, and it is hereby fully understood and declared by this convention, that if the southerly bend or extreme of Lake Michigan should extend so far south that a line drawn due east from it should

not intersect Lake Erie, or if it should intersect the said Lake Erie east of the mouth of the Miami River of the Lake, then, and in that case, with the assent of the Congress of the United States, the northern boundary of this State shall be established by, and extending to, a direct line running from the southern extremity of Lake Michigan to the most northerly cape of the Miami Bay, after intersecting the due-north line from the mouth of the Great Miami River as aforesaid; thence northeast to the territorial line, and by the said territorial line to the Pennsylvania line.

In accordance with the provisions in the enabling act, and in the first constitution of the State, the northern boundary of the State was changed so that, instead of running on a parallel drawn from the southern extremity of Lake Michigan, it followed the arc of a great circle drawn from the southern extremity of Lake Michigan to the most northern cape of Maumee ("Miami") Bay.

Following are the texts of the acts providing for the examination of the northern boundary and making the change in the boundary:

AN ACT to provide for the taking of certain observations preparatory to the adjustment of the northern boundary line of the State of Ohio.

That the President of the United States cause to be ascertained, by accurate observation, the latitude and longitude of the southerly extreme of Lake Michigan; and that he cause to be ascertained, by like observation, the point on the Miami of the Lake which is due east therefrom, and also the latitude and longitude of the most northerly cape of the Miami Bay; also, that he cause to be ascertained, with all practicable accuracy, the latitude and longitude of the most southerly point in the northern boundary line of the United States in Lake Erie, and also the points at which a direct line drawn from the southerly extreme of Lake Michigan to the most southerly point in said northern boundary line of the United States will intersect the Miami River and Bay; and also that he cause to be ascertained, by like observation, the point in the Mississippi which is due west from the southerly extreme of Lake Michigan; and that the said observations be made and the result thereof returned to the proper Department within the current year. (Twenty-second Congress, first session, 1832.)

AN ACT to establish the northern boundary line of the State of Ohio, and to provide for the admission of the State of Michigan into the Union.

The northern boundary line of the State of Ohio shall be established at and shall be a direct line drawn from the southern extremity of Lake Michigan to the most northerly cape of the Maumee (Miami) Bay after that line, so drawn, shall intersect the eastern boundary line of the State of Indiana; and from the said north cape of the said bay northeast to the boundary line between the United States and the province of Upper Canada, in Lake Erie, and thence, with the said last-mentioned line, to its intersection with the western line of the State of Pennsylvania. (Twenty-fourth Congress, first session, 1836.)

The northern boundary was originally surveyed in 1817. The western boundary was surveyed in the same year from old Fort Recovery to the northwestern corner. South of Fort Recovery this boundary was surveyed as the first principal meridian of the General Land Office.

INDIANA.

By the act passed in the year 1800, to take effect on and after the 4th day of July of that year, the Territory Northwest of the River Ohio was divided into two parts, the eastern part to retain the old name, the western part to become the Territory of Indiana.

Under this act the Territory of Indiana was organized. The description of the boundary line between these two Territories is given in the following act establishing them:

That from and after the fourth day of July next all that part of the territory of the United States northwest of the Ohio River, which lies to the westward of a line beginning at the Ohio, opposite to the mouth of Kentucky River, and running thence to Fort Recovery, and thence north until it shall intersect the territorial line between the United States and Canada, shall, for the purpose of temporary government, constitute a separate Territory, and be called Indiana Territory.

SEC. 5. That whenever that part of the territory of the United States which lies to the eastward of a line beginning at the mouth of the Great Miami River, and running thence due north to the territorial line between the United States and Canada, shall be erected into an independent State, and admitted into the Union on an equal footing with the original States, thenceforth said line shall become and remain permanently the boundary line between such State and the Indiana Territory, anything in this act contained to the contrary notwithstanding. (Sixth Congress, first session.)

Ohio was admitted in 1802. Its western boundary, a meridian through the mouth of the Miami River, left a narrow strip of country between Ohio and the Territory of Indiana, which was by a clause in the enabling act of Ohio added to Indiana Territory. The following is the clause in question:

SEC. 3. All that part of the territory of the United States northwest of the river Ohio heretofore included in the eastern division of said Territory, and not included within the boundary herein prescribed for the said State, is hereby attached to and made a part of the Indiana Territory.

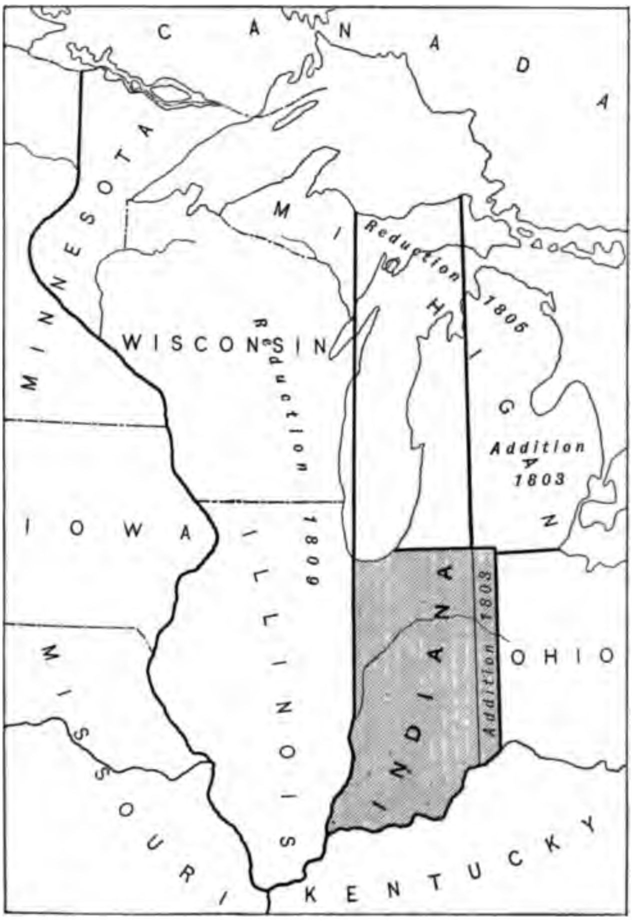
On the 30th of June, 1805, the northern portion of Indiana Territory was cut off and organized as Michigan Territory. (For the divisional line between these, see Michigan, p. 119.)

On March 1, 1809, Indiana Territory was divided, and the western portion of it organized as Illinois Territory. (For a description of the divisional line between these two Territories, see Illinois, p. 119.) On December 11, 1816, Indiana was admitted as a State with the limits as given in the following extract from the enabling act, which have not since been changed.

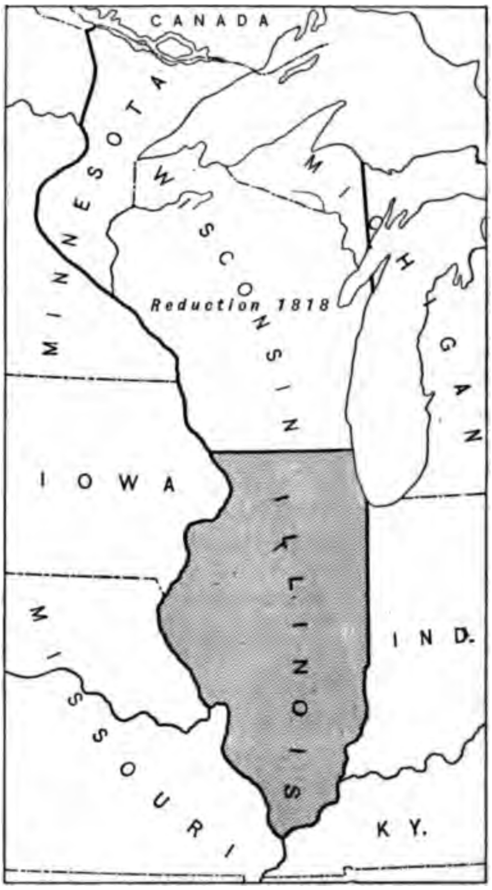
AN ACT to enable the people of the Indiana Territory to form a constitution and State government and for the admission of such State into the Union on an equal footing with the original States.

The said State shall consist of all the territory included within the following boundaries, to wit: Bounded on the east by the meridian line which forms the western boundary of the State of Ohio; on the south by the river Ohio from the mouth of the Great Miami River to the mouth of the River Wabash; on the west by a line drawn along the middle of the Wabash from its mouth to a point where a due north line drawn from the town of Vincennes would last touch the northwestern shore of the said river; and from thence by a due north line, until the same shall intersect an east and west line drawn through a point 10 miles north of the southern extreme of Lake Michigan; on the north by the said east and west line until the same shall intersect the first-mentioned meridian line which forms the western boundary of the State of Ohio. (Fourteenth Congress, first session.)

The north boundary of Indiana was surveyed and marked in 1827, and its west boundary by a joint commission of the two States, Indiana and Illinois.



HISTORICAL DIAGRAM OF INDIANA.



HISTORICAL DIAGRAM OF ILLINOIS.

ILLINOIS.

Illinois Territory, originally part of the Northwest Territory, and subsequently a part of Indiana Territory, was organized on March 1, 1809. The following clause from the act separating it from Indiana Territory defines its boundary:

AN ACT for dividing the Indiana Territory into two separate governments.

From and after the first day of March next, all that part of the Indiana Territory which lies west of the Wabash River and a direct line drawn from the said Wabash River and Post Vincennes due north to the territory line between the United States and Canada shall, for the purpose of temporary government, constitute a separate Territory and be called Illinois. (Tenth Congress, second session.)

On December 3, 1818, it was admitted as a State, with its present boundaries. The enabling act defines these boundaries as follows:

AN ACT to enable the people of the Illinois Territory to form a constitution and State government, and for the admission of such State into the Union on an equal footing with the original States.

The said State shall consist of all the territory included within the following boundaries, to wit: Beginning at the mouth of the Wabash River; thence up the same and with the line of Indiana to the northwest corner of said State; thence east with the line of the same State to the middle of Lake Michigan; thence north along the middle of said lake to north latitude forty-two degrees thirty minutes; thence west to the middle of the Mississippi River; and thence down along the middle of that river to its confluence with the Ohio River; and thence up the latter river along its northwestern shore to the beginning. (Fifteenth Congress, second session.)

The northern boundary of Illinois was run and marked in 1832–33.

MICHIGAN.

Michigan was organized as a Territory June 30, 1805, from the northern part of Indiana Territory.

The following clause from the act dividing Indiana Territory defines its limits:

From and after the thirtieth day of June next all that part of the Indiana Territory which lies north of a line drawn east from the southerly bend or extreme of Lake Michigan, until it shall intersect Lake Erie, and east of a line drawn from the said southerly bend through the middle of said lake to its northern extremity, and thence due north to the northern boundary of the United States, shall, for the purpose of temporary government, constitute a separate Territory, and be called Michigan. (Eighth Congress, second session.)

This line was run and marked in 1827.

The enabling act for Illinois, passed in 1818, contained a provision transferring to the Territory of Michigan the portion of the Territory of Illinois not included in the State of that name. The following is the text of the clause referred to:

All that part of the territory of the United States lying north of the State of Indiana, and which was included in the former Indiana Territory, together with that part of the Illinois Territory which is situated north of and not included within the boundaries prescribed by this act, to the State thereby authorized to be formed, shall be, and hereby is, attached to and made a part of the Michigan Territory, from and after the formation of the said State.

In 1834 an act was passed extending the limits of the Territory of Michigan to the Missouri River.

The clause of this act relating to area is as follows:

AN ACT to attach the territory of the United States west of the Mississippi River and north of the State of Missouri to the Territory of Michigan.

All that part of the territory of the United States bounded on the east by the Mississippi River, on the south by the State of Missouri and a line drawn due west from the northwest corner of said State to the Missouri River; on the southwest and west by the Missouri River and the White Earth River, falling into the same; and on the north by the northern boundary of the United States, shall be, and hereby is, for the purpose of temporary government, attached to and made a part of the Territory of Michigan.

In 1836 Wisconsin Territory was formed from that part of Michigan Territory lying west of the present limits of the State of that name. (*Vide* Wisconsin, p. 121.)

The boundary line between Michigan and Wisconsin, between the sources of Brule and Montreal rivers, was run and marked in 1847.

Reduced to its present limits, as described in the following clause from its enabling act, Michigan was admitted to the Union January 26, 1837:

AN ACT to provide for the admission of the State of Michigan into the Union.

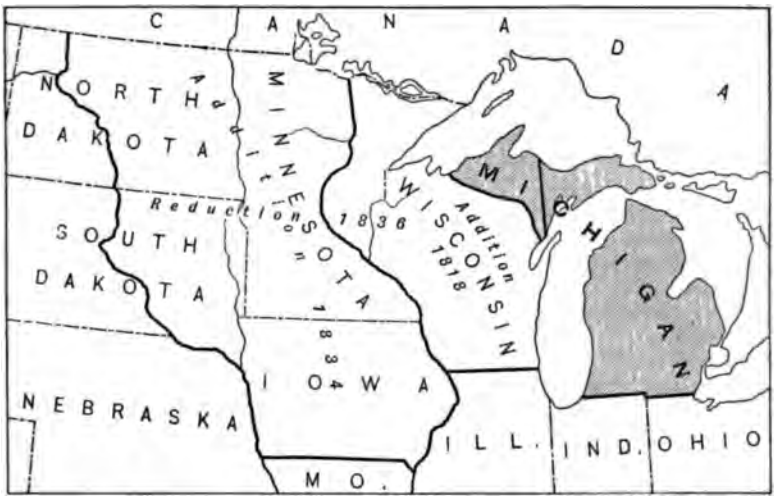
Beginning at the point where the above-described northern boundary of the State of Ohio intersects the eastern boundary of the State of Indiana, and running thence with the said boundary line of Ohio, as described in the first section of this act, until it intersects the boundary line between the United States and Canada in Lake Erie; thence with the said boundary line between the United States and Canada, through the Detroit River, Lake Huron, and Lake Superior, to a point where the said line last touches Lake Superior; thence in a direct line through Lake Superior to the mouth of the Montreal River; thence through the middle of the main channel of the said river Montreal to the middle of the Lake of the Desert; thence in a direct line to the nearest headwater of the Menomonee River; thence through the middle of that fork of the said river first touched by the said line to the main channel of the said Menomonee River; thence down the center of the main channel of the same to the center of the most usual ship channel of the Green Bay of Lake Michigan; thence through the center of the most usual ship channel of the said bay to the middle of Lake Michigan; thence through the middle of Lake Michigan to the northern boundary of the State of Indiana, as that line was established by the act of Congress of the nineteenth of April, eighteen hundred and sixteen; thence due east with the north boundary line of the said State of Indiana to the northeast corner thereof; and thence south with the east boundary line of Indiana to the place of beginning. (Twenty-fourth Congress, first session.)

The above boundaries remain unchanged.

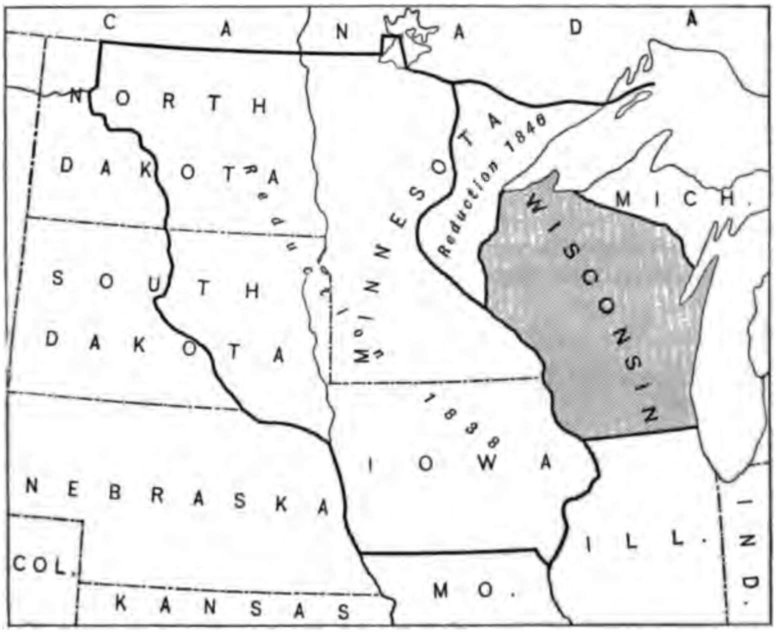
WISCONSIN.

Wisconsin was organized as a Territory July 3, 1836. As originally constituted its area comprised all that part of the former Territory of Michigan which lay outside of the present limits of the State of Michigan. The limits are defined in the act for its organization as follows:

Bounded on the east by a line drawn from the northeast corner of the State of Illinois, through the middle of Lake Michigan, to a point in the middle of said lake and opposite the main channel of Green Bay, and through said channel and Green Bay to



HISTORICAL DIAGRAM OF MICHIGAN.



HISTORICAL DIAGRAM OF WISCONSIN.

the mouth of the Menomonee; thence through the middle of the main channel of said river to that head of said river nearest to the Lake of the Desert; thence in a direct line to the middle of said lake; thence through the middle of the main channel of the Montreal River to its mouth; thence with a direct line across Lake Superior to where the territorial line of the United States last touches said lake northwest; thence on the north with the said territorial line to the White Earth River, on the west by a line from the said boundary line following down the middle of the main channel of White Earth River to the Missouri River, and down the middle of the main channel of the Missouri River to a point due west from the northwest corner of the State of Missouri, and on the south from said point due east to the northwest corner of the State of Missouri; and thence with the boundaries of the States of Missouri and Illinois as already fixed by acts of Congress. (Twenty-fourth Congress, first session.)

In 1838 all that part of the territory lying west of the Mississippi and a line drawn due north from its source to the international boundary—that is, all that part which was originally comprised in the Louisiana purchase—was organized as the Territory of Iowa. (See Iowa, p. 123.)

On August 9, 1846, an enabling act for Wisconsin was passed giving the boundaries as follows:

Beginning at the northeast corner of the State of Illinois, that is to say, at a point in the center of Lake Michigan where the line of forty-two degrees and thirty minutes of north latitude crosses the same; thence running with the boundary line of the State of Michigan, through Lake Michigan, Green Bay, to the mouth of the Menomonee River; thence up the channel of said river to the Brule River; thence up said last-mentioned river to Lake Brule; thence along the southern shore of Lake Brule in a direct line to the center of the channel between Middle and South islands in the Lake of the Desert; thence in a direct line to the headwaters of Montreal River, as marked upon the survey made by Captain Cramm; thence down the main channel of the Montreal River to the middle of Lake Superior; thence through the center of Lake Superior to the mouth of the Saint Louis River; thence up the main channel of said river to the first rapids in the same, above the Indian village, according to Nicollet's map; thence due south to the main branch of the river Saint Croix; thence down the middle of the main channel of said river to the Mississippi; thence down the center of the main channel of that river to the northwest corner of the State of Illinois; thence due east with the northern boundary of the State of Illinois to the place of beginning. (Twenty-ninth Congress, first session.)

On March 3, 1847, a supplementary act for the admission of Wisconsin was passed by Congress, in which the western boundary of the proposed State was changed as follows:

That the assent of Congress is hereby given to the change of boundary proposed in the first article of said constitution, to wit: Leaving the boundary line prescribed in the act of Congress entitled "An act to enable the people of Wisconsin Territory to form a constitution and State government, and for the admission of such State into the Union," at the first rapids in the river St. Louis; thence in a direct line southwardly to a point fifteen miles east of the most easterly point of Lake St. Croix; thence due south to the main channel of the Mississippi River or Lake Pepin; thence down the said main channel, as prescribed in said act. (Twenty-ninth Congress, second section.)

On May 29, 1848, Wisconsin was admitted into the Union.

The boundary between this State and Minnesota from St. Louis to St. Croix River was surveyed and marked in 1852, under the General Land Office.

MISSOURI.

The name of the Territory of Louisiana was changed in 1812 to Missouri, by act of Congress. At that time the Territory comprised all of the original Louisiana purchase, excepting the State of Louisiana, which had been formed from it. The Territory of Arkansas, with limits very similar to those of the present State, was formed from it in 1819. On August 10, 1821, the *State* of Missouri was formed and admitted, with limits, excepting as to the northwest corner, the same as at present.

Boundaries are defined as follows:

Beginning in the middle of the Mississippi River, on the parallel of thirty-six degrees of north latitude; thence west along that parallel of latitude to the Saint Francois River; thence up and following the course of that river, in the middle of the main channel thereof, to the parallel of latitude of thirty-six degrees and thirty minutes; thence west along the same to a point where the said parallel is intersected by a meridian line passing through the middle of the mouth of the Kansas River where the same empties into the Missouri River; thence from the point aforesaid north along the said meridian line to the intersection of the parallel of latitude which passes through the rapids of the river Des Moines, making the said line to correspond with the Indian boundary line; thence east from the point of intersection last aforesaid along the said parallel of latitude to the middle of the channel of the main fork of the said river Des Moines; thence down and along the middle of the main channel of the said river Des Moines to the mouth of the same where it empties into the Mississippi River; thence due east to the middle of the main channel of the Mississippi River; thence down and following the course of the Mississippi River, in the middle of the main channel thereof, to the place of beginning. (Sixteenth Congress, first session.)

In 1836 the boundaries were extended on the northwest to the Missouri River, as described in the following act of the legislature amendatory to the constitution of 1820:

That the boundary of the State be so altered and extended as to include all that tract of land lying on the north side of the Missouri River and west of the present boundary of this State, so that the same shall be bounded on the south by the middle of the main channel of the Missouri River and on the north by the present northern boundary line of the State, as established by the constitution, when the same is continued in a right line to the west, or to include so much of said tract of land as Congress may assent.

This was ratified by Congress in the following act:

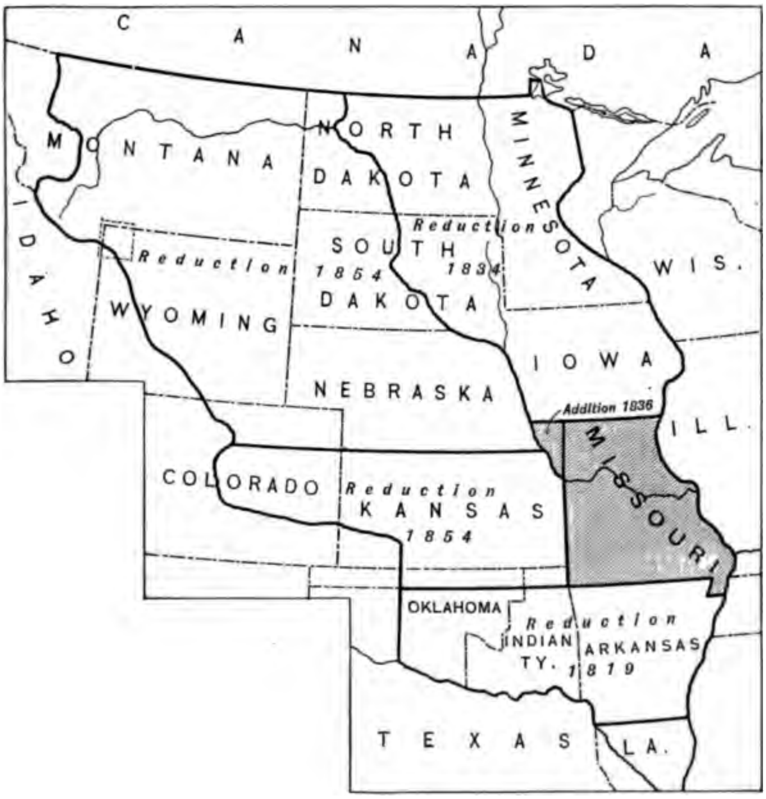
AN ACT to extend the western boundary of the State of Missouri to the Missouri River.

That when the Indian title to all the lands lying between the State of Missouri and the Missouri River shall be extinguished, the jurisdiction over said lands shall be hereby ceded to the State of Missouri, and the western boundary of said State shall be then extended to the Missouri River. (Twenty-fourth Congress, first session.)

The north boundary of Missouri was surveyed and marked in part in 1816, and the remainder in 1850, under the General Land Office.

The western boundary was run and marked, from the mouth of Kansas River to the southwestern corner of the State, in 1823.

The territory remaining after the formation of the State bore the name of Missouri for many years thereafter. Meanwhile, however, it



HISTORICAL DIAGRAM OF MISSOURI.

was reduced by the formation of several Territories which were carved from its area. In 1834 the part north of the State of Missouri and east of Missouri and White Earth rivers was annexed to the Territory of Michigan. (For further history of this portion, *vide* Michigan, p. 119; Iowa, below; Minnesota, p. 124; and Dakota, p. 127.) In 1854 Kansas and Nebraska Territories were formed, absorbing the remainder. (*Vide* Kansas, p. 125, and Nebraska, p. 126.)

The following are the boundaries of Missouri as at present established: The east boundary is the mid-channel of the Mississippi River from the mouth of the Des Moines to its point of intersection with the thirty-sixth parallel of latitude; the south boundary begins at the latter point and runs west on the parallel of 36 degrees of latitude to the Saint Francis River, thence up the mid-channel of that river to the parallel of latitude 39° 30′, thence west on that parallel to its intersection by a meridian passing through the middle of the mouth of the Kansas River; the west boundary is the last-mentioned meridian as far north as the mouth of the Kansas River, thence it follows northwestward the mid-channel of the Missouri River to the parallel of latitude passing through the rapids of Des Moines River, which is approximately the parallel of 40° 35′; the north boundary is the last-mentioned parallel as far east as its point of intersection with the Des Moines River, whence it follows the mid-channel of the Des Moines River southward to its mouth.

IOWA.

Iowa was organized as a Territory on July 3, 1838, being formed from a portion of Wisconsin Territory. The limits were defined as follows in the act creating it:

> All that part of the present Territory of Wisconsin which lies west of the Mississippi River and west of the line drawn due north from the headwaters or sources of the Mississippi to the Territorial line. (Twenty-fifth Congress, second session. See Wisconsin, p. 115.)

The following clause from an act passed in 1839 is supplementary to the above act:

> AN ACT to define and establish the eastern boundary line of the Territory of Iowa.
>
> That the middle or centre of the main channel of the river Mississippi shall be deemed, and is hereby declared, to be the eastern boundary line of the Territory of Iowa, so far or to such extent as the said Territory is bounded eastwardly by or upon said river. (Twenty-fifth Congress, third session.)

Iowa was admitted to the Union on March 3, 1845. As originally constituted the limits of the State were quite different from those which it has at present.

The following extract from the enabling act gives the original limits:

> That the following shall be the boundaries of the said State of Iowa, to wit: Beginning at the mouth of the Des Moines River at the middle of the Mississippi; thence by the middle of the channel of that river to a parallel of latitude passing through the mouth of the Mankato, or Blue Earth River; thence west along the

said parallel of latitude to a point where it is intersected by a meridian line, seventeen degrees and thirty minutes west of the meridian of Washington City; thence due south to the northern boundary line of the State of Missouri; thence eastwardly following that boundary to the point at which the same intersects the Des Moines River; thence by the middle of the channel of that river to the place of beginning. (Twenty-eighth Congress, second session.)

On December 28, 1846, an act was passed changing the boundaries of the State and giving it its present limits.

The following extract from the act defines the boundaries as at present constituted:

Beginning in the middle of the main channel of the Mississippi River, at a point due east of the middle of the mouth of the main channel of the Des Moines River; thence up the middle of the main channel of the said Des Moines River to a point on said river where the northern boundary line of the State of Missouri, as established by the constitution of that State, adopted June twelfth, eighteen hundred and twenty, crosses the said middle of the main channel of the said Des Moines River; thence westwardly along the said northern boundary line of the State of Missouri, as established at the time aforesaid, until an extension of said line intersect the middle of the main channel of the Missouri River, to a point opposite the middle of the main channel of the Big Sioux River, according to Nicollet's map; thence up the main channel of the said Big Sioux River, according to said map, until it is intersected by the parallel of forty-three degrees and thirty minutes north latitude; thence east along said parallel of forty-three degrees and thirty minutes, until said parallel intersect the middle of the main channel of the Mississippi River; thence down the middle of the main channel of said Mississippi River to the place of beginning.

Its northern boundary was surveyed and marked in 1852, under the General Land Office.

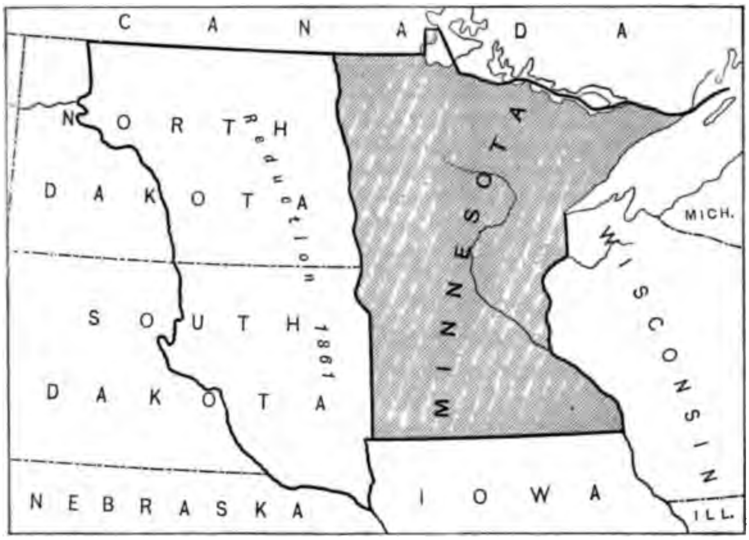
MINNESOTA.

The Territory of Minnesota was organized on March 3, 1849, and originally comprised the portion of the former Territory of Iowa, outside of the limits of the present State of Iowa, extending east to the west boundary line of Wisconsin. The terms of the act creating this Territory, so far as they relate to its boundary, are as follows:

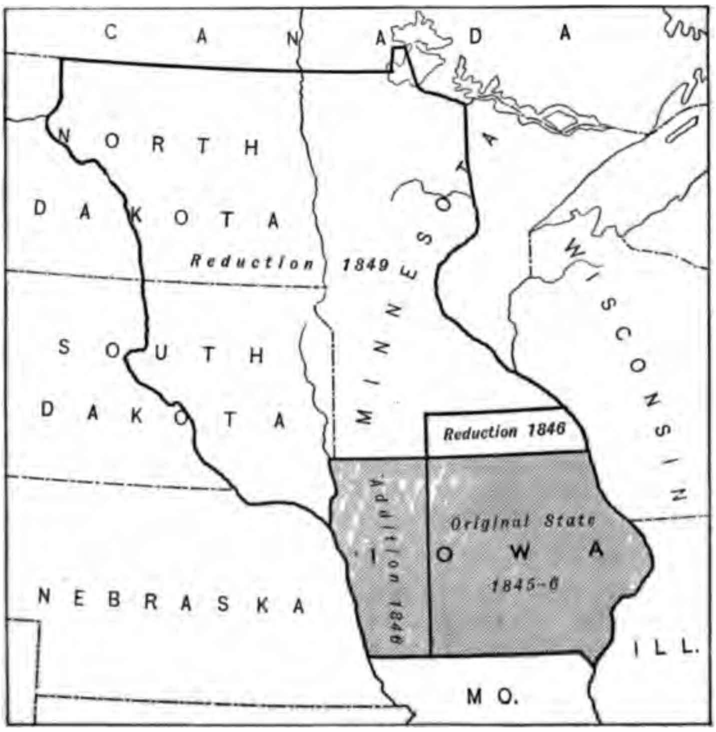
All that part of the territory of the United States which lies within the following limits, to wit: Beginning in the Mississippi River, at the point where the line of forty-three degrees and thirty minutes of north latitude crosses the same; thence running due west on said line, which is the northern boundary of the State of Iowa, to the northwest corner of the said State of Iowa; thence southerly along the western boundary of said State to the point where said boundary strikes the Missouri River; thence up the middle of the main channel of the Missouri River to the mouth of the White Earth River; thence up the middle of the main channel of the White Earth River to the boundary line between the possessions of the United States and Great Britain to Lake Superior; thence along the western boundary line of said State of Wisconsin to the Mississippi River; thence down the main channel of said river to the place of beginning. (Thirtieth Congress, second session.)

Minnesota was admitted as a State on May 11, 1858, with the same boundaries which it has at present. These are given in the enabling act as follows:

Beginning at the point in the center of the main channel of the Red River of the North where the boundary line between the United States and the British Possessions



HISTORICAL DIAGRAM OF MINNESOTA.



HISTORICAL DIAGRAM OF IOWA.

> crosses the same; thence up the main channel of said river to that of the Bois des Sioux River; thence up the main channel of said river to Lake Traverse; thence up the center of said lake to the southern extremity thereof; thence in a direct line to the head of Big Stone Lake; thence through its center to its outlet; thence by a due south line to the north line of the State of Iowa; thence east along the northern boundary of said State to the main channel of the Mississippi River; thence up the main channel of said river, and following the boundary line of the State of Wisconsin until the same intersects the Saint Louis River; thence down said river to and through Lake Superior, on the boundary line of Wisconsin and Michigan, until it intersects the dividing line between the United States and the British Possessions; thence up Pigeon River, and following said dividing line, to the place of beginning.

The western boundary line, from Big Sioux River to Minnesota River, was surveyed and marked in 1859–60, under the General Land Office.

KANSAS.

The Territory of Kansas was organized on May 30, 1854, from a part of Missouri Territory. The following clause from the act of organization defines its limits:

> SECTION 19. All that part of the territory of the United States included within the following limits, except such portions thereof as are hereinafter expressly exempted from the operations of this act, to wit: Beginning at a point on the western boundary of the State of Missouri, where the thirty-seventh parallel of north latitude crosses the same; thence west on said parallel to the eastern boundary of New Mexico; thence north on said boundary to latitude thirty-eight; thence following said boundary westward to the east boundary of the Territory of Utah, on the summit of the Rocky Mountains; thence northward on said summit to the fortieth parallel of latitude; thence east on said parallel to the western boundary of the State of Missouri; thence south with the western boundary of said State to the place of beginning, be, and the same is hereby, created into a temporary government by the name of the Territory of Kansas.

A portion of this Territory was given up to Colorado at the time of its formation in 1861. (*Vide* Colorado, p. 130.)

Kansas was admitted into the Union on January 29, 1861, with its present boundaries, which are thus defined in the enabling act:

> The said State shall consist of all the territory included within the following boundaries, to wit: Beginning at a point on the western boundary of the State of Missouri where the thirty-seventh parallel of north latitude crosses the same; thence west on said parallel to the twenty-fifth meridian of longitude west from Washington; thence north on said meridian to the fortieth parallel of latitude; thence east on said parallel to the western boundary of the State of Missouri; thence south with the western boundary of said State to the place of beginning.

The south boundary was surveyed and marked by Col. J. E. Johnston, in 1857. This line was subsequently retraced and re-marked by deputy surveyors, in the extension of the public land surveys. The western boundary was surveyed in 1872, under the General Land Office.

The north boundary, which is the base line for the sixth principal meridian, was run by deputy surveyors of the General Land Office, 1855–59, the initial point, on the Missouri river, having been determined by Capt. Lee, U. S. topographical engineer.

NEBRASKA.

The Territory of Nebraska was formed on May 30, 1854, from the northwestern part of Missouri Territory. Its limits, as originally constituted, are defined as follows in the act of organization:

> Beginning at a point in the Missouri River where the fortieth parallel of north latitude crosses the same; thence west on said parallel to the east boundary of the Territory of Utah, on the summit of the Rocky Mountains; thence on said summit northward to the forty-ninth parallel of north latitude; thence east on said parallel to the western boundary of the Territory of Minnesota; thence southward on said boundary to the Missouri River; thence down the main channel of said river to the place of beginning, be, and the same is hereby, created into a temporary government by the name of the Territory of Nebraska. (Thirty-third Congress, first session.)

This area was reduced in 1861 by the formation of the Territories of Colorado and Dakota. (*Vide* Colorado, p. 130, and Dakota, p. 127.)

The State of Nebraska was admitted on March 1, 1867.

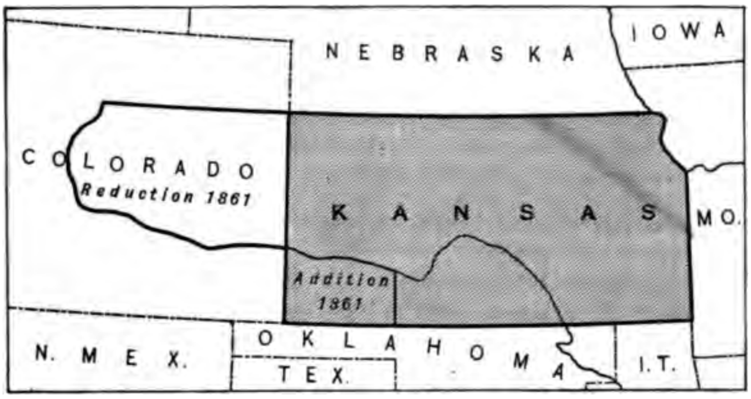
Its limits are defined as follows in the enabling act:

> That the said State of Nebraska shall consist of all the territory included within the following boundaries, to wit: Commencing at a point formed by the intersection of the western boundary of the State of Missouri with the fortieth degree of north latitude; extending thence due west along said fortieth degree of north latitude to a point formed by its intersection with the twenty-fifth degree of longitude west from Washington; thence north along said twenty-fifth degree of longitude to a point formed by its intersection with the forty-first degree of north latitude; thence west along said forty-first degree of north latitude to a point formed by its intersection with the twenty-seventh degree of longitude west from Washington; thence north along said twenty-seventh degree of west longitude to a point formed by its intersection with the forty-third degree of north latitude; thence east along said forty-third degree of north latitude to the Keyapaha River; thence down the middle of the channel of said river, with its meanderings, to its junction with the Niobrara River; thence down the middle of the channel of said Niobrara River, and following the meanderings thereof, to its junction with the Missouri River; thence down the middle of the channel of said Missouri River, and following the meanderings thereof, to the place of beginning. (Thirty-eighth Congress, first session.)

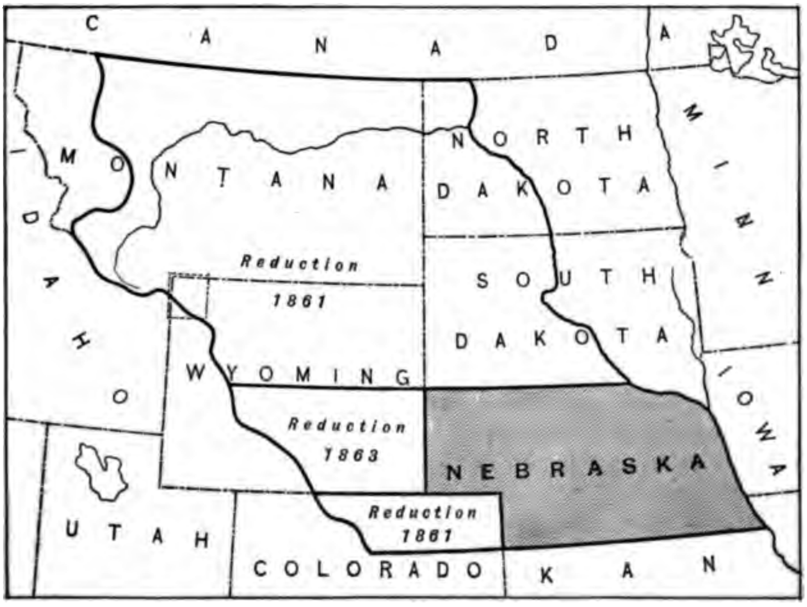
In 1870 an act was passed to redefine a portion of the boundary between Nebraska and the Territory of Dakota, the pertinent portion of which is as follows:

> That so soon as the State of Nebraska, through her legislature, has given her consent thereto, the center of the main channel of the Missouri River shall be the boundary line between the State of Nebraska and Territory of Dakota, between the following points, to wit: Commencing at a point in the center of said main channel, north of the west line of section twenty-four in township twenty-nine north, of range eight east of the sixth principal meridian, and running along the same to a point west of the most northerly portion of fractional section seventeen, of township twenty-nine north, of range nine east of said meridian, in the State of Nebraska, as meandered and shown by the plats and surveys of said sections originally made and now on file in the General Land Office. (Forty-first Congress, second session.)

The west boundary on the twenty-fifth degree of longitude west of Washington, between latitudes 40° and 41°, the south boundary on the forty-first parallel from the twenty-fifth degree of longitude to the



HISTORICAL DIAGRAM OF KANSAS.



HISTORICAL DIAGRAM OF NEBRASKA.

twenty-seventh degree, and the west boundary on the twenty-seventh degree of longitude, between the forty-first degree and the forty-third degree, were surveyed and marked in 1869, under the General Land Office.

In 1882 an act was passed transferring to this State from Dakota a small area lying between the Keyapaha River and the forty-third parallel of latitude. The following is the act in question:

> *Be it enacted,* * * * That the northern boundary of the State of Nebraska shall be, and hereby is, subject to the provisions hereinafter contained, extended so as to include all that portion of the Territory of Dakota lying south of the forty-third parallel of north latitude and east of the Keyapaha River and west of the main channel of the Missouri River. (Forty-seventh Congress, first session.)

The north boundary, from the Keyapaha River westward, was surveyed in 1873. In 1893 the part of this boundary east of Keyapaha River was surveyed and the remainder resurveyed. All this was done under the General Land Office.

NORTH DAKOTA AND SOUTH DAKOTA.

The Territory of Dakota was organized on March 2, 1861, from parts of Minnesota and Nebraska Territories. The following from the act of organization defines its original limits:

> All that part of the territory of the United States included within the following limits, namely: Commencing at a point in the main channel of the Red River of the North where the forty-ninth degree of north latitude crosses the same; thence up the main channel of the same and along the boundary of the State of Minnesota to Big Stone Lake; thence along the boundary line of the said State of Minnesota to the Iowa line; thence along the boundary line of the State of Iowa to the point of intersection between the Big Sioux and Missouri rivers; thence up the Missouri River and along the boundary line of the Territory of Nebraska to the mouth of the Niobrara or Running Water River; thence following up the same, in the middle of the main channel thereof, to the mouth of the Keyapaha or Turtle Hill River; thence up said river to the forty-third parallel of north latitude; thence due west to the present boundary of the Territory of Washington; thence along the boundary line of Washington Territory to the forty-ninth degree of north latitude; thence east along said forty-ninth degree of north latitude to the place of beginning, be, and the same is hereby, organized into a temporary government by the name of the Territory of Dakota. (Thirty-sixth Congress, second session.)

In 1863 the Territory of Idaho was formed, its area having been taken from Washington, Dakota, and Nebraska. (*Vide* Idaho, p. 134.) In 1882 a small area was transferred to Nebraska. (*Vide* Nebraska, above.)

In 1877 that part of the west boundary between latitudes 43° and 45° was surveyed and marked, under the General Land Office.

On November 2, 1889, the Territory of Dakota was divided into North and South Dakota, and each was admitted as a State. The following extract from the enabling act defines the boundary between these States:

> The area comprising the Territory of Dakota shall * * * be divided on the line of the seventh standard parallel produced due west to the western boundary of said Territory.

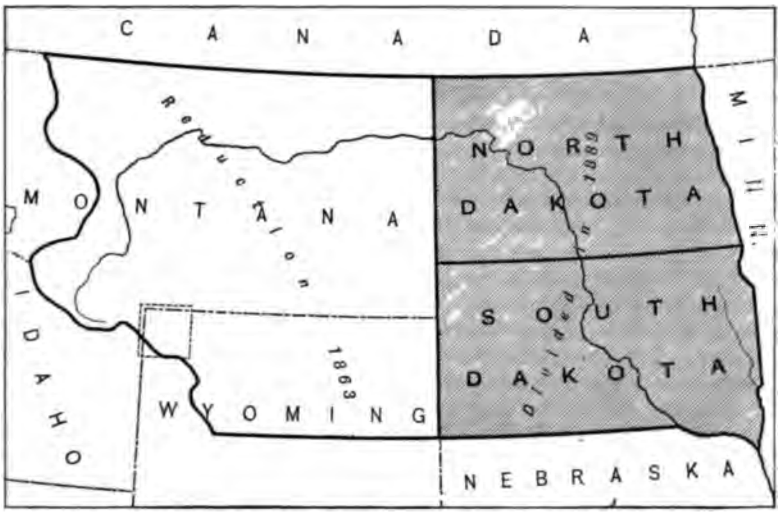
The boundary line between the two States was surveyed in 1891-92, under the General Land Office.

OKLAHOMA.

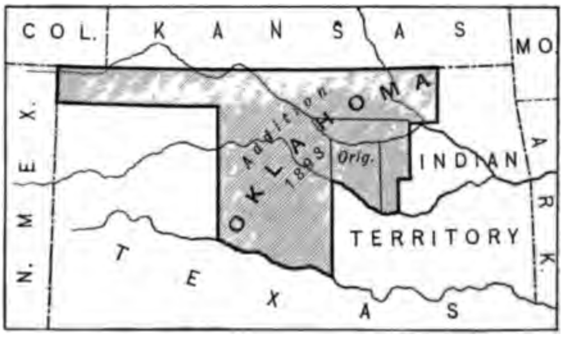
The Territory of Oklahoma was organized under an act passed May 2, 1890, from the western part of the Indian Territory. Its limits as originally constituted were as is set forth in the following act:

> *Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled*, SEC. 1. That all that portion of the United States now known as the Indian Territory, except so much of the same as is actually occupied by the Five Civilized Tribes, and the Indian tribes within the Quapaw Indian Agency, and except the unoccupied part of the Cherokee Outlet, together with that portion of the United States known as the Public Land Strip, is hereby erected into a temporary government by the name of the Territory of Oklahoma. The portion of the Indian Territory included in said Territory of Oklahoma is bounded by a line drawn as follows: Commencing at a point where the ninety-eighth meridian crosses the Red River; thence by said meridian to the point where it crosses the Canadian River; thence along said river to the west line of the Seminole country; thence along said line to the north fork of the Canadian River; thence down said river to the west line of the Creek country; thence along said line to the northwest corner of the Creek country; thence along the north line of the Creek country to the ninety-sixth meridian; thence northward by said meridian to the southern boundary line of Kansas; thence west along said line to the Arkansas River; thence down said river to the north line of the land occupied by the Ponca tribe of Indians, from which point the line runs so as to include all the lands occupied by the Ponca, Tonkawa, Otoe and Missouria, and the Pawnee tribes of Indians until it strikes the south line of the Cherokee Outlet, which it follows westward to the east line of the State of Texas; thence by the boundary line of the State of Texas to the point of beginning. The Public Land Strip which is included in said Territory of Oklahoma is bounded east by the one hundredth meridian, south by Texas, west by New Mexico, north by Colorado and Kansas. Whenever the interest of the Cherokee Indians in the land known as the Cherokee Outlet shall have been extinguished and the President shall make proclamation thereof, said outlet shall thereupon and without further legislation become a part of the Territory of Oklahoma. Any other lands within the Indian Territory not embraced within these boundaries shall hereafter become a part of the Territory of Oklahoma whenever the Indian nation or tribe owning such lands shall signify to the President of the United States in legal manner its assent that such lands shall so become a part of said Territory of Oklahoma, and the President shall thereupon make proclamation to that effect.

The lands embraced within the limits above set forth comprised the present Territory of Oklahoma, with the exception of an area on the north known as the Cherokee Strip, and provision was made for its incorporation, without additional legislation, within the Territory whenever the Indian title to it should be extinguished. This was done and the strip was added to the Territory by proclamation of the President, issued in September, 1893, giving Oklahoma its present limits. These differ from those above set forth only in a part of the northern boundary, which now corresponds with the south boundary of Kansas from the ninety-sixth meridian west.



HISTORICAL DIAGRAM OF NORTH DAKOTA AND SOUTH DAKOTA.



HISTORICAL DIAGRAM OF OKLAHOMA.

MONTANA.

The Territory of Montana was organized May 26, 1864, from a portion of Idaho. Its limits, which have been changed but slightly, are given in the following extract from the organizing act:

> That all that part of the territory of the United States included within the limits to wit: Commencing at a point formed by the intersection of the twenty-seventh degree of longitude west from Washington with the forty-fifth degree of north latitude; thence due west on said forty-fifth degree of latitude to a point formed by its intersection with the thirty-fourth degree of longitude west from Washington; thence due south along said thirty-fourth degree of longitude to its intersection with the forty-fourth degree and thirty minutes of north latitude; thence due west along said forty-fourth degree and thirty minutes of north latitude to a point formed by its intersection with the crest of the Rocky Mountains; thence following the crest of the Rocky Mountains northward till its intersection with the Bitter Root Mountains; thence northward along the crest of said Bitter Root Mountains to its intersection with the thirty-ninth degree of longitude west from Washington; thence along said thirty-ninth degree of longitude northward to the boundary line of the British possessions; thence eastward along said boundary line to the twenty-seventh degree of longitude west from Washington; thence southward along said twenty-seventh degree of longitude to the place of beginning, be, and the same is hereby, created into a temporary government by the name of the Territory of Montana. (Thirty-eighth Congress, first session.)

In 1873 Congress, under the erroneous impression that a portion of Dakota remained west of Wyoming, and adjoining Montana, passed an act to attach it to Montana. As, however, no such detached area could by any possibility have existed, the compilers of the Revised Statutes sought to give the act effect by shifting a portion of the southern boundary of Montana from the parallel of 44° 30′ to the continental watershed, thereby reducing Montana's area. The following is the act referred to:

AN ACT to readjust the western boundary of Dakota Territory.

> That all that portion of Dakota Territory lying west of the one hundred and eleventh meridian of longitude which, by an erroneous definition of the boundaries of said Territory by a former act of Congress, remains detached and distant from Dakota proper some two hundred miles, be, and the same is hereby, attached to the adjoining territory of Montana. (Forty-second Congress, third session.)

The boundaries of Montana are as follows: Beginning at the intersection of the twenty-seventh meridian of longitude with the boundary line between the United States and the British possessions, it follows said meridian south to the forty-fifth parallel of latitude, thence west on this parallel to the thirty-fourth meridian, south on the thirty-fourth meridian to the point where that meridian intersects the continental watershed, thence westward and northwestward, following the line of the continental watershed and the summit of the Bitter Root range, to its intersection with the thirty-ninth meridian; thence north on the thirty-ninth meridian to the boundary line between the United States and British possessions and east on that boundary line to the point of beginning.

The east boundary of Montana was surveyed and marked in 1885, and the south boundary in 1879–80, under the General Land Office. That portion of the west boundary between the crest of the Bitterroot Mountains and the Canada line was surveyed and marked in 1898–99, under the United States Geological Survey.

Montana was admitted as a State on November 8, 1889, with the above boundaries.

WYOMING.

Wyoming was organized as a Territory on July 25, 1868, from an area previously comprised in the Territory of Idaho. Its limits, which are the same as originally constituted, are defined in the following clause from the act creating the Territory:

> That all that part of the United States described as follows: Commencing at the intersection of the twenty-seventh meridian of longitude west from Washington with the forty-fifth degree of north latitude, and running thence west to the thirty-fourth meridian of west longitude, thence south to the forty-first degree of north latitude, thence east to the twenty-seventh meridian of west longitude, and thence north to the place of beginning, be, and the same is hereby, organized into a temporary government by the name of the Territory of Wyoming. (Fortieth Congress, second session.)

Wyoming was admitted as a State on July 10, 1890, with the above boundaries.

The south and west boundaries were surveyed and marked in 1873, under the General Land Office.

COLORADO.

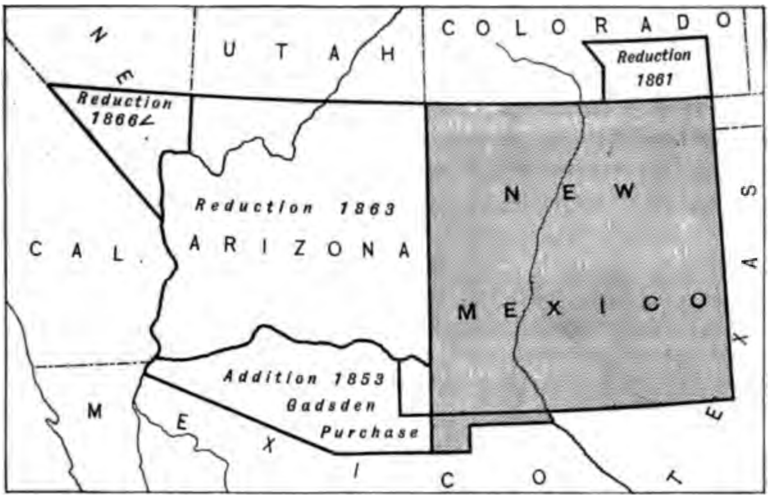
Colorado was organized as a Territory on February 28, 1861, with the limits which it has at present, being made from portions of Utah, New Mexico, Kansas, and Nebraska.

On August 1, 1876, it was admitted as a State.

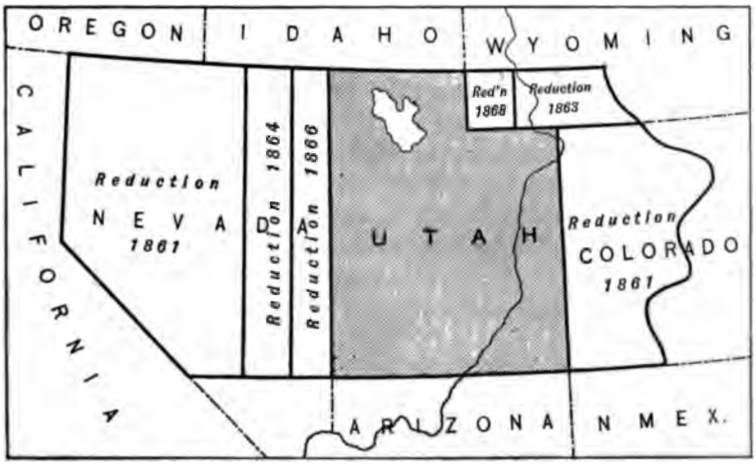
The following clause from the enabling act gives its limits:

> AN ACT to enable the people of Colorado to form a constitution and State government, and for the admission of such State into the Union on an equal footing with the original States.
>
> SEC. 2. That the said State of Colorado shall consist of all the territory included within the following boundaries, to-wit: Commencing at a point formed by the intersection of the thirty-seventh degree of north latitude with the twenty-fifth degree of longitude west from Washington; extending thence due west along said thirty-seventh degree of north latitude to a point formed by its intersection with the thirty-second degree of longitude west from Washington; thence due north along said thirty-second degree of west longitude to a point formed by its intersection with the forty-first degree of north latitude; thence due east along said forty-first degree of north latitude to a point formed by its intersection with the twenty-fifth degree of longitude west from Washington; thence due south along said twenty-fifth degree of west longitude. (Thirty-eighth Congress, first session.)

The south boundary of Colorado was run and marked in 1868 and 1874, and the west boundary in 1878–79. The latter line was retraced and re-marked in 1885. All this was under the General Land Office.



HISTORICAL DIAGRAM OF NEW MEXICO.



HISTORICAL DIAGRAM OF UTAH.

NEW MEXICO.

New Mexico was organized as a Territory on December 13, 1850. Its original area formed a part of the region transferred by Mexico to the United States by the treaty of Guadalupe-Hidalgo and by Texas. It was subsequently enlarged by the Gadsden Purchase. The formation of Colorado Territory in 1861 and of Arizona in 1863 reduced its area to its present limits. (*Vide* Colorado, p. 130, and Arizona, p. 132.)

The following clause from the act creating the Territory gives its original limits:

> SECTION 2. And be it further enacted, That all that portion of the territory of the United States bounded as follows: Beginning at a point in the Colorado River, where the boundary line with the Republic of Mexico crosses the same; thence eastwardly with the said boundary line to the Rio Grande; thence following the main channel of said river to the parallel of the thirty-second degree of north latitude; thence east with said degree to its intersection with the one hundred and third degree of longitude west of Greenwich; thence north with said degree of longitude to the parallel of thirty-eighth degree of north latitude; thence west with said parallel to the summit of the Sierra Madre; thence south with the crest of said mountains to the thirty-seventh parallel of north latitude; thence west with said parallel to its intersection with the boundary line of the State of California; thence with said boundary line to the place of beginning—be, and the same is hereby, erected into a temporary government by the name of the Territory of New Mexico. (Thirty-first Congress, first session.)

The present boundaries of New Mexico are as follows: Beginning at the point of intersection of the one hundred and third meridian of longitude west of Greenwich with the thirty-seventh parallel of latitude; running thence south to its point of intersection with the thirty-second parallel of latitude; thence west on this parallel to its intersection with the Rio Grande; thence southerly down the main channel of the Rio Grande to its point of intersection with the boundary line between the United States and Mexico; thence with this boundary to its intersection with the thirty-second meridian of longitude; thence north along this meridian to the thirty-seventh parallel of latitude, and so along that parallel to the point of beginning.

The west boundary of New Mexico was run and marked in 1875, under the General Land Office.

UTAH.

Utah was organized on September 9, 1850, from territory acquired from Mexico by the treaty of Guadalupe-Hidalgo. Its limits originally extended from the eastern boundary of California to the Rocky Mountains, and from the thirty-seventh to the forty-second parallel. This area was reduced by the formation, in 1861, of the Territories of Nevada (*vide* p. 132) and Colorado (*see* p. 130), and in 1864 and 1866 by the extension eastward of the limits of the State of Nevada (*vide* p. 133).

The following is an extract from the act creating the Territory.

> All that part of the territory of the United States included within the following limits, to wit: Bounded on the west by the State of California, on the north by the Territory of Oregon, and on the east by the summit of the Rocky Mountains, and on the south by the thirty-seventh parallel of north latitude, be, and the same is hereby, created into a temporary government, by the name of the Territory of Utah.

The present boundaries of Utah are as follows: Commencing with the intersection of the forty-second parallel of latitude with the thirty-fourth meridian of longitude; running thence south on this meridian to the forty-first parallel of latitude; thence east on this parallel to the thirty-second meridian of longitude; thence south on this meridian to its intersection with the thirty-seventh parallel of latitude; thence west upon this parallel of latitude to its intersection with the thirty-seventh meridian of longitude; thence north on this meridian to its intersection with the forty-seventh parallel of latitude; thence east on the forty-seventh parallel of latitude to the point of beginning.

Utah was admitted as a State on January 4, 1896, with the above boundaries.

Its north boundary, from longitude 34° to 37°, was surveyed and marked in 1871, and its west boundary in 1870, under the General Land Office.

ARIZONA.

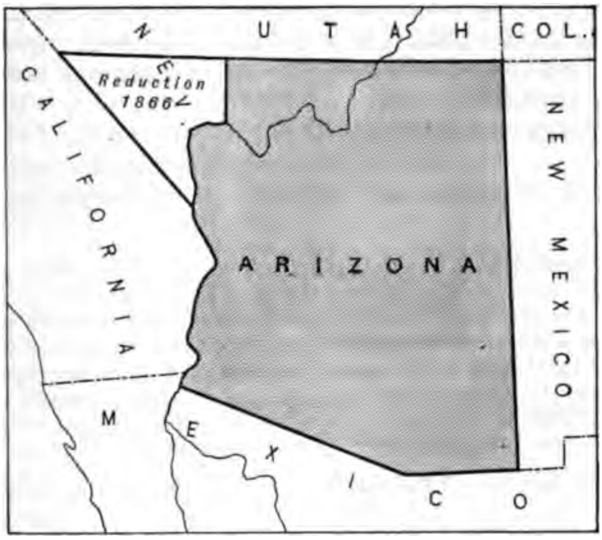
Arizona was organized as a Territory on February 24, 1863. Its area was formerly comprised in the Territory of New Mexico. In 1866 a portion of it was cut off and given to the State of Nevada. (*Vide* Nevada, below.) The following clause from the act creating it gives its limits as originally constituted:

> That all that part of the present Territory of New Mexico situate west of the line running due south from the point where the southwest corner of the Territory of Colorado joins the northern boundary of the Territory of New Mexico to the southern boundary line of said Territory of New Mexico be, and the same is hereby, erected into a temporary government by the name of the Territory of Arizona. (For limits of the piece cut off and added to Nevada, see that State.)

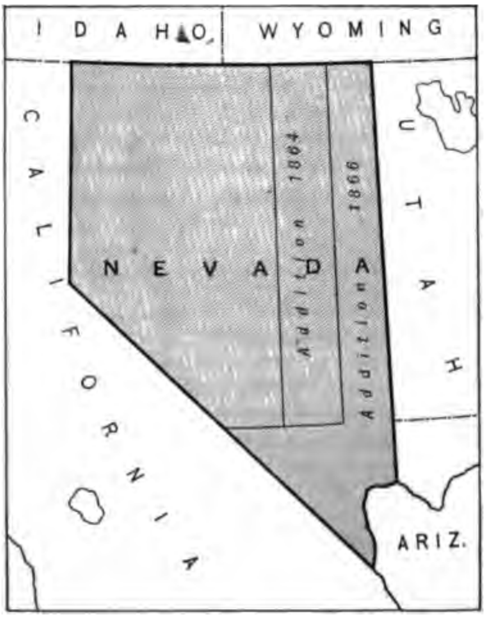
The present boundaries of Arizona are as follows: Beginning at the point of intersection of the thirty-seventh parallel of latitude with the thirty-second meridian of longitude; thence south along this meridian to its intersection with the boundary line between the United States and Mexico; thence with this boundary to the Colorado River; thence up the middle of the main channel of the Colorado River to its point of intersection with the thirty-seventh meridian of longitude; north on this meridian to its intersection with the thirty-seventh parallel; and eastward along the thirty-seventh parallel to the point of beginning.

NEVADA.

Nevada, as originally constituted on March 2, 1861, was formed from territory taken from Utah. Its western boundary was made to conform to the eastern boundary of California (*vide* California, p. 136); its north-



HISTORICAL DIAGRAM OF ARIZONA.



HISTORICAL DIAGRAM OF NEVADA.

ern boundary was, as now, the forty-second parallel; the eastern was the meridian of 39°, and the southern the parallel of 37°. By the enabling act the eastern limit was extended to the thirty-eighth meridian. It was admitted as a State October 31, 1864, with above limits as modified by the enabling act, and in 1866 its eastern limits were still further extended to longitude 37°, and its southern line established as at present, the latter addition having been made from Arizona.

In the act organizing the Territory the boundaries are defined as follows:

Beginning at the point of intersection of the forty-second degree of north latitude with the thirty-ninth degree of longitude west from Washington; thence running south on the line of said thirty-ninth degree of west longitude until it intersects the northern boundary line of the Territory of New Mexico; thence due west to the dividing ridge separating the waters of Carson Valley from those that flow into the Pacific; thence on said dividing ridge northwardly to the forty-first degree of north latitude; thence due north to the southern boundary of the State of Oregon; thence due east to the place of beginning. (Thirty-sixth Congress, second session.)

The following is the text of that portion of the enabling act relating to boundaries:

SEC. 2. That the said State of Nevada shall consist of all the territory included within the following boundaries, to wit: Commencing at a point formed by the intersection of the thirty-eighth degree of longitude west from Washington with the thirty-seventh degree of north latitude; thence due west along said thirty-seventh degree of north latitude to the eastern boundary line of the State of California; thence in a northwesterly direction along the said eastern boundary line of the State of California to the forty-third degree of longitude west from Washington; thence north along said forty-third degree of west longitude and said eastern boundary line of the State of California to the forty-second degree of north latitude; thence due east along the said forty-second degree of north latitude to a point formed by its intersection with the aforesaid thirty-eighth degree of longitude west from Washington; thence due south down said thirty-eighth degree of west longitude to the place of beginning. (Thirty-eighth Congress, first session.)

The following act makes the addition to its area from Arizona referred to above:

AN ACT concerning the boundaries of the State of Nevada.

That, as provided for and consented to in the constitution of the State of Nevada, all that territory and tract of land adjoining the present eastern boundary of the State of Nevada, and lying between the thirty-seventh and the forty-second degrees of north latitude and west of the thirty-seventh degree of longitude west of Washington, is hereby added to and made a part of the State of Nevada.

SEC. 2. That there is hereby added to and made a part of the State of Nevada all that extent of territory lying within the following boundaries, to wit: Commencing on the thirty-seventh degree of north latitude at the thirty-seventh degree of longitude west from Washington, and running thence south on said degree of longitude to the middle of the river Colorado of the West; thence down the middle of said river to the eastern boundary of the State of California; thence northwesterly along said boundary of California to the thirty-seventh degree of north latitude; and thence east along said degree of latitude to the point of beginning. (Thirty-ninth Congress, first session.)

The present limits of Nevada are as follows:

The east boundary is the thirty-seventh meridian of longitude, extending from the forty-second parallel of latitude southward to its intersection with the middle of the Colorado River; thence following the mid-channel of the Colorado River down to the point where it intersects the thirty-fifth parallel of latitude; the southwest boundary is the arc of a great circle running from the last-mentioned point and the point of intersection of the one hundred and twentieth degree of longitude west of Greenwich with the thirty-ninth parallel of latitude; the west boundary is the one hundred and twentieth degree of longitude west of Greenwich; the north boundary is the forty-second parallel of latitude.

The north boundary was surveyed and marked in 1873, and the west boundary, from latitude 42° south to Lake Tahoe and thence southeast to Colorado River, in latitude 35°, in 1872, under the General Land Office. Between 1890 and 1899 the United States Coast and Geodetic Survey, under an appropriation by Congress, ran a new line from Lake Tahoe to Colorado River, differing widely in some places from the former line. At this writing this line has not yet been accepted as the boundary.

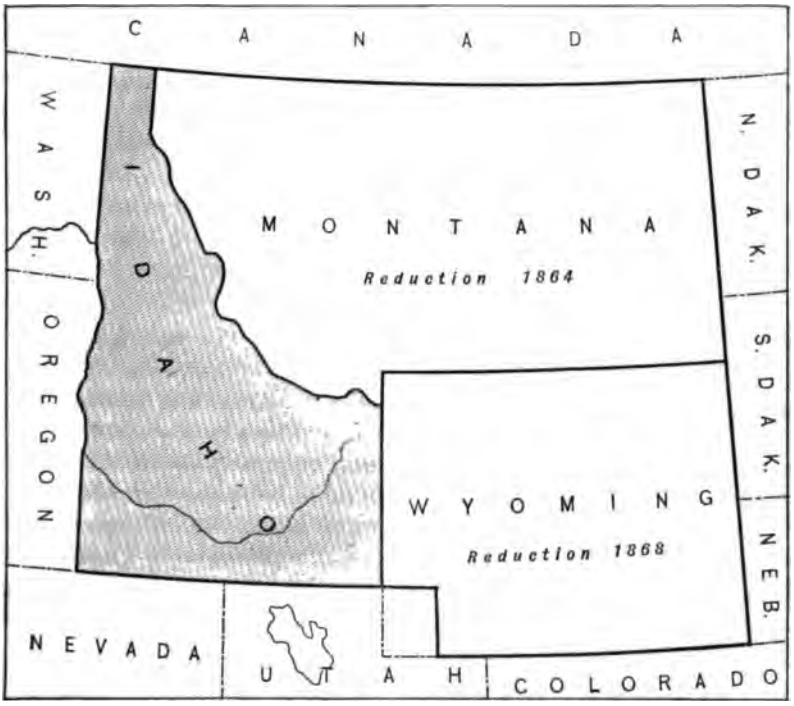
IDAHO.

The Territory of Idaho was formed March 3, 1863, from parts of Washington, Dakota, and Nebraska. Its original limits, which included, besides the present territory, all of Montana and Wyoming, were given as follows in the act organizing the Territory:

> That all that part of the territory of the United States included within the following limits, to wit: Beginning at a point in the middle channel of the Snake River where the northern boundary of Oregon intersects the same; then follow down said channel of Snake River to a point opposite the mouth of the Kooskooskia, or Clearwater River; thence due north to the forty-ninth parallel of latitude; thence east along said parallel to the twenty-seventh degree of longitude west of Washington; thence south along said degree of longitude to the northern boundary of Colorado Territory; thence west along said boundary to the thirty-third degree of longitude west of Washington; thence north along said degree to the forty-second parallel of latitude; thence west along said parallel to the eastern boundary of the State of Oregon; thence north along said boundary to the place of beginning. (Thirty-seventh Congress, third session.)

From this were formed Montana in 1864 (*vide* Montana, p. 129), and Wyoming (*vide* Wyoming, p. 130), in 1868, thereby reducing this territory, with the small addition made in 1873 (*vide* Montana, p. 129), to its present limits.

The present boundary line of Idaho is as follows: Beginning at the intersection of the thirty-ninth meridian with the boundary line between the United States and the British Possessions, it follows said meridian south until it reaches the summit of the Bitter Root Mountains; thence southeastward along the crest of the Bitter Root range and the continental divide until it intersects the meridian of thirty-four degrees of longitude; thence southward on this meridian to the forty-second parallel



HISTORICAL DIAGRAM OF IDAHO.

of latitude; thence west on this parallel of latitude to its intersection with a meridian drawn through the mouth of the Owyhee River; north on this meridian to the mouth of the Owyhee River; thence down the mid-channel of the Snake River to the mouth of the Clearwater; and thence north on the meridian which passes through the mouth of the Clearwater to the boundary line between the United States and the British Possessions; and east on said boundary line to the place of beginning.

On July 3, 1890, Idaho was admitted as a State, with the above limits.

The west boundary of Idaho, from the mouth of Clearwater River to the forty-ninth parallel, was surveyed and marked in 1873–74. The longitude of this line has been determined by the United States Geological Survey to be 117° 02′ 34″. The west boundary, from the mouth of Owyhee River south to the Nevada boundary, was surveyed and marked in 1867. Its longitude has been determined as 117° 01′ 56″ by the United States Geological Survey. Both these lines were run under the General Land Office.

OREGON.

Oregon Territory was organized August 14, 1848. The grounds of our title to its area are obscure. In treating with Great Britain for the establishment of our northern boundary west of the Rocky Mountains this region was claimed on three grounds—that of discovery and occupation, the Louisiana purchase, and cession from Spain. On which of these grounds we succeeded in having the boundary established on the forty-ninth parallel will never be ascertained, and is of little moment.

The Territory as originally established extended from the forty-second to the forty-ninth parallel, and from the Pacific Ocean to the crest of the Rocky Mountains, with boundaries defined in the organizing act as follows:

> All that part of the territory of the United States which lies west of the summit of the Rocky Mountains, north of the forty-second degree of north latitude, known as the Territory of Oregon, shall be organized into and constitute a temporary government by the name of the Territory of Oregon. (Thirtieth Congress, first session.)

In 1853 the Territory was reduced by the formation of Washington Territory (*vide* Washington, p. 136), and on February 14, 1859, it was admitted as a State with its present boundaries. These are defined below in an extract from the State constitution:

> Beginning one marine league at sea due west from the point where the forty-second parallel of north latitude intersects the same; thence northerly, at the same distance from the line of the coast lying west and opposite the State, including all islands within the jurisdiction of the United States, to a point due west and opposite the middle of the north ship channel of the Columbia River; thence easterly to and up the middle channel of said river, and where it is divided by islands, up the middle of the widest channel thereof, and in like manner up the middle of the main channel of Snake River to the mouth of the Owyhee River; thence due south to the parallel

of latitude forty-two degrees north; thence west along said parallel to the place of beginning, including jurisdiction in civil and criminal cases upon the Columbia River and Snake River concurrently with States and Territories of which those rivers form a boundary in common with this State. But the Congress of the United States, in providing for the admission of this State into the Union, may make the said northern boundary conform to the act creating the Territory of Washington.

The boundary line between Oregon and Washington on the forty-sixth parallel of latitude was surveyed and marked in 1864, under the General Land Office.

WASHINGTON.

This was organized March 2, 1853, from a part of Oregon Territory. Its limits, as originally constituted, were as given in the following clause from the act of Congress creating it:

> That from and after the passage of this act all that portion of Oregon Territory lying and being south of the forty-ninth degree of north latitude, and north of the middle of the main channel of the Columbia River from its mouth to where the forty-sixth degree of north latitude crosses said river, near Fort Walla Walla, thence with said forty-sixth degree of latitude to the summit of the Rocky Mountains, be organized into and constitute a temporary government by the name of the Territory of Washington. (Thirty-second Congress, second session.)

In 1859, on the formation of the State of Oregon, the residue of the Territory of Oregon, being the portion lying east of the present limits of the State, extending thence to the crest of the Rocky Mountains, was added to Washington. This area, with the part of Washington lying east of its present limits, was included in Idaho on the formation of that Territory in 1863.

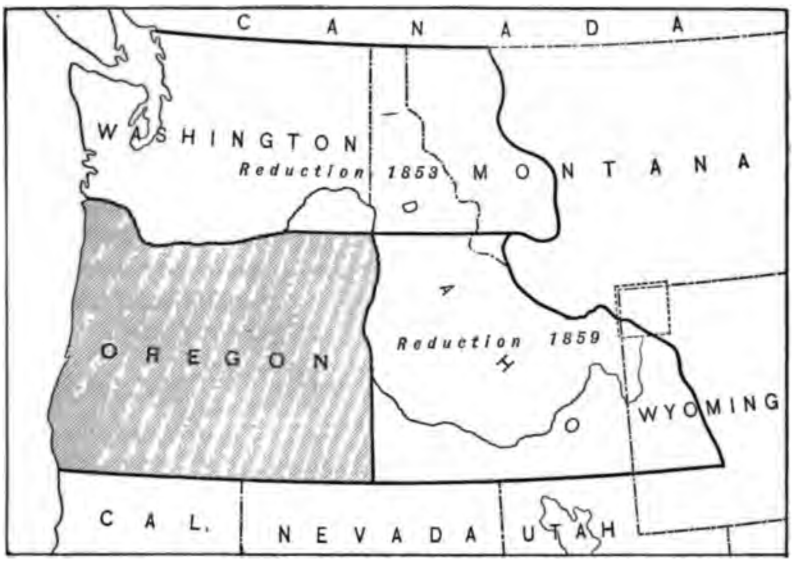
The present boundaries of Washington Territory are as follows: Beginning on the coast at the mouth of the Columbia River; following up the main channel of the Columbia River to its point of intersection with the forty-sixth parallel of latitude; thence east on the forty-sixth parallel to the Snake River; thence down the main channel of the Snake River to the mouth of the Clearwater; thence north on the meridian which passes through the mouth of the Clearwater to the boundary line between the United States and the British possessions; thence west with that boundary line to the Pacific.

Washington was admitted as a State on November 11, 1889, with its limits as above defined.

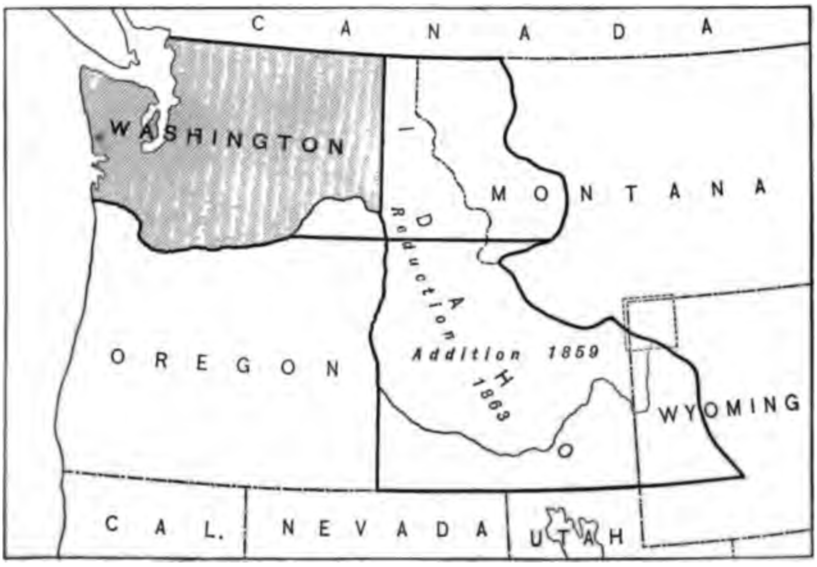
CALIFORNIA.

California was admitted to the Union on September 9, 1850. Its area was taken from territory acquired from Mexico by the treaty of Guadelupe-Hidalgo. Its limits, as defined in the State constitution, are as follows:

> Commencing at the point of intersection of forty-second degree of north latitude with the one hundred and twentieth degree of longitude west from Greenwich, and running south on the line of said one hundred and twentieth degree of west longitude until it intersects the thirty-ninth degree of north latitude; thence running in



HISTORICAL DIAGRAM OF OREGON.



HISTORICAL DIAGRAM OF WASHINGTON.

a straight line in a southeasterly direction to the river Colorado, at a point where it intersects the thirty-fifth degree of north latitude; thence down the middle of the channel of said river to the boundary line between the United States and Mexico as established by the treaty of May 30, 1848; thence running west and along said boundary line to the Pacific Ocean, and extending therein three English miles; thence running in a northwesterly direction and following the direction of the Pacific coast to the forty-second degree of north latitude; thence on the line of said forty-second degree of north latitude to the place of beginning. Also all the islands, harbors, and bays along and adjacent to the Pacific coast.

The northern boundary was surveyed and marked in 1868–69, under the General Land Office.

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113. A Report of Work done in the Division of Chemistry during the Fiscal Years 1891–'92 and 1892–'93. F. W. Clarke, Chief Chemist. 1893. 8°. 115 pp. Price 15 cents.

114. Earthquakes in California in 1893, by Charles D. Perrine. 1894. 8°. 23 pp. Price 5 cents.

115 A Geographic Dictionary of Rhode Island, by Henry Gannett. 1894. 8°. 31 pp. Price 5 cents.

116. A Geographic Dictionary of Massachusetts, by Henry Gannett. 1894. 8°. 126 pp. Price 15 cents.

117. A Geographic Dictionary of Connecticut, by Henry Gannett. 1894. 8°. 67 pp. Price 10 cents.

118. A Geographic Dictionary of New Jersey, by Henry Gannett. 1894. 8°. 131 pp. Price 15 cents.

119. A Geological Reconnoissance in Northwest Wyoming, by George Homans Eldridge. 1894. 8°. 72 pp. 4 pl. Price 10 cents.

120. The Devonian System of Eastern Pennsylvania and New York, by Charles S. Prosser. 1895. 8°. 81 pp. 2 pl. Price 10 cents.

121. A Bibliography of North American Paleontology, by Charles Rollin Keyes. 1894. 8°. 251 pp. Price 20 cents.

122. Results of Primary Triangulation, by Henry Gannett. 1894. 8°. 412 pp. 17 pl. Price 25 cents.

123. A Dictionary of Geographic Positions, by Henry Gannett. 1895. 8°. 183 pp. 1 pl. Price 15 cents.

124. Revision of North American Fossil Cockroaches, by Samuel Hubbard Scudder. 1895. 8°. 176 pp. 12 pl. Price 15 cents.

125. The Constitution of the Silicates, by Frank Wigglesworth Clarke. 1895. 8°. 109 pp. Price 15 cents.

126. A Mineralogical Lexicon of Franklin, Hampshire, and Hampden Counties, Massachusetts, by Benjamin Kendall Emerson. 1895. 8°. 180 pp. 1 pl. Price 15 cents.

127. Catalogue and Index of Contributions to North American Geology, 1732–1891, by Nelson Horatio Darton. 1896. 8°. 1045 pp. Price 60 cents.

128. The Bear River Formation and its Characteristic Fauna, by Charles A. White. 1895. 8°. 108 pp. 11 pl. Price 15 cents.

129. Earthquakes in California in 1894, by Charles D. Perrine. 1895. 8°. 25 pp. Price 5 cents.

130. Bibliography and Index of North American Geology, Paleontology, Petrology, and Mineralogy for 1892 and 1893, by Fred Boughton Weeks. 1896. 8°. 210 pp. Price 20 cents.

131. Report of Progress of the Division of Hydrography for the Calendar Years 1893 and 1894, by Frederick Haynes Newell, Topographer in Charge. 1895. 8°. 126 pp. Price 15 cents.

132. The Disseminated Lead Ores of Southeastern Missouri, by Arthur Winslow. 1896. 8°. 31 pp. Price 5 cents.

133. Contributions to the Cretaceous Paleontology of the Pacific Coast: The Fauna of the Knoxville Beds, by T. W. Stanton. 1895. 8°. 132 pp. 20 pl. Price 15 cents.

134. The Cambrian Rocks of Pennsylvania, by Charles Doolittle Walcott. 1896. 8°. 43 pp. 15 pl. Price 5 cents.

135. Bibliography and Index of North American Geology, Paleontology, Petrology, and Mineralogy for the Year 1894, by F. B. Weeks. 1896. 8°. 141 pp. Price 15 cents.

136. Volcanic Rocks of South Mountain, Pennsylvania, by Florence Bascom. 1896. 8°. 124 pp. 28 pl. Price 15 cents.

137. The Geology of the Fort Riley Military Reservation and Vicinity, Kansas, by Robert Hay. 1896. 8°. 35 pp. 8 pl. Price 5 cents.

138. Artesian-Well Prospects in the Atlantic Coastal Plain Region, by N. H. Darton. 1896. 8°. 228 pp. 19 pl. Price 20 cents.

139. Geology of the Castle Mountain Mining District, Montana, by W. H. Weed and L. V. Pirsson. 1896. 8°. 164 pp. 17 pl. Price 15 cents.

140. Report of Progress of the Division of Hydrography for the Calendar Year 1895, by Frederick Haynes Newell, Hydrographer in Charge. 1896. 8°. 356 pp. Price 25 cents.

141. The Eocene Deposits of the Middle Atlantic Slope in Delaware, Maryland, and Virginia, by William Bullock Clark. 1896. 8°. 167 pp. 40 pl. Price 15 cents.

142. A Brief Contribution to the Geology and Paleontology of Northwestern Louisiana, by T. Wayland Vaughan. 1896. 8°. 65 pp. 4 pl. Price 10 cents.

143. A Bibliography of Clays and the Ceramic Arts, by John C. Branner. 1896. 8°. 114 pp. Price 15 cents.

144. The Moraines of the Missouri Coteau and their Attendant Deposits, by James Edward Todd. 1896. 8°. 71 pp. 21 pl. Price 10 cents.

145. The Potomac Formation in Virginia, by W. M. Fontaine. 1896. 8°. 149 pp. 2 pl. Price 15 cents.

146. Bibliography and Index of North American Geology, Paleontology, Petrology, and Mineralogy for the Year 1895, by F. B. Weeks. 1896. 8°. 130 pp. Price 15 cents.

147. Earthquakes in California in 1895, by Charles D. Perrine, Assistant Astronomer in Charge of Earthquake Observations at the Lick Observatory. 1896. 8°. 23 pp. Price 5 cents.

148. Analyses of Rocks, with a Chapter on Analytical Methods, Laboratory of the United States Geological Survey, 1880 to 1896, by F. W. Clarke and W. F. Hillebrand. 1897. 8°. 306 pp. Price 20 cents.

149. Bibliography and Index of North American Geology, Paleontology, Petrology, and Mineralogy for the Year 1896, by Fred Boughton Weeks. 1897. 8°. 152 pp. Price 15 cents.

150. The Educational Series of Rock Specimens Collected and Distributed by the United States Geological Survey, by Joseph Silas Diller. 1898. 8°. 400 pp. 47 pl. Price 25 cents.

151. The Lower Cretaceous Gryphæas of the Texas Region, by R. T. Hill and T. Wayland Vaughan. 1898. 8°. 139 pp. 35 pl. Price 15 cents.

152. A Catalogue of the Cretaceous and Tertiary Plants of North America, by F. H. Knowlton. 1898. 8°. 247 pp. Price 20 cents.

153. A Bibliographic Index of North American Carboniferous Invertebrates, by Stuart Weller. 1898. 8°. 653 pp. Price 35 cents.

154. A Gazetteer of Kansas, by Henry Gannett. 1898. 8°. 246 pp. 6 pl. Price 20 cents.

155. Earthquakes in California in 1896 and 1897, by Charles D. Perrine, Assistant Astronomer in Charge of Earthquake Observations at the Lick Observatory. 1898. 8°. 47 pp. Price 5 cents.

156. Bibliography and Index of North American Geology, Paleontology, Petrology, and Mineralogy for the Year 1897, by Fred Boughton Weeks. 1898. 8°. 130 pp. Price 15 cents.

157. The Gneisses, Gabbro-Schists, and Associated Rocks of Southwestern Minnesota, by Christopher Webber Hall. 1899. 8°. 160 pp. 27 pl. Price 45 cents.

158. The Moraines of Southeastern South Dakota and their Attendant Deposits, by James Edward Todd. 1899. 8°. 171 pp. 27 pl. Price 25 cents.

159. The Geology of Eastern Berkshire County, Massachusetts, by B. K. Emerson. 1899. 8°. 139 pp. 9 pl. Price 20 cents.

160. A Dictionary of Altitudes in the United States (Third Edition), compiled by Henry Gannett. 1899. 8°. 775 pp. Price 40 cents.

161. Earthquakes in California in 1898, by Charles D. Perrine, Assistant Astronomer in Charge of Earthquake Observations at the Lick Observatory. 1899. 8°. 31 pp. 1 pl. Price 5 cents.

162. Bibliography and Index of North American Geology, Paleontology, Petrology, and Mineralogy for the Year 1898, by Fred Boughton Weeks. 1899. 8°. 163 pp. Price 15 cents.

163. Flora of the Montana Formation, by Frank Hall Knowlton. 1900. 8°. 118 pp. 19 pl. Price 15 cents.

164. Reconnaissance in the Rio Grande Coal Fields of Texas, by Thomas Wayland Vaughan, including a Report on Igneous Rocks from the San Carlos Coal Field, by E. C. E. Lord. 1900. 8°. 100 pp. 11 pl. and maps. Price 20 cents.

165. Contributions to the Geology of Maine, by Henry S. Williams and Herbert E. Gregory. 1900. 8°. 212 pp. 14 pl. Price 25 cents.

166. A Gazetteer of Utah, by Henry Gannett. 1900. 8°. 43 pp. 1 map. Price 15 cents.

167. Contributions to Chemistry and Mineralogy from the Laboratory of the United States Geological Survey, Frank W. Clarke, Chief Chemist. 1900. 8°. 166 pp. Price 15 cents.

168. Analyses of Rocks, Laboratory of the United States Geological Survey, 1880 to 1899, tabulated by F. W. Clarke, Chief Chemist. 1900. 8°. 308 pp. Price 20 cents.

169. Altitudes in Alaska, by Henry Gannett. 1900. 8°. 13 pp. Price 5 cents.

170. Survey of the Boundary Line between Idaho and Montana from the International Boundary to the Crest of the Bitterroot Mountains, by Richard Urquhart Goode. 1900. 8°. 67 pp. 14 pl. Price 15 cents.

171. Boundaries of the United States and of the Several States and Territories, with an Outline of the History of all Important Changes of Territory (Second Edition), by Henry Gannett. 1900. 8°. 142 pp. 53 pl. Price 30 cents.

In preparation:

172. Bibliography and Index of North American Geology, Paleontology, Petrology, and Mineralogy for the Year 1899, by Fred Boughton Weeks.

173. Synopsis of American Fossil Bryozoa, including Bibliography and Synonymy, by John M. Nickles and Ray S. Bassler.

174. Survey of the Northwestern Boundary of the United States, 1857-1860, by Marcus Baker.

175. Triangulation and Spirit Leveling in Indian Territory, by C. H. Fitch.

— Bibliography and Catalogue of the Fossil Vertebrata of North America, by Oliver Perry Hay.

WATER-SUPPLY AND IRRIGATION PAPERS.

By act of Congress approved June 11, 1896, the following provision was made:

"*Provided*, That hereafter the reports of the Geological Survey in relation to the gauging of streams and to the methods of utilizing the water resources may be printed in octavo form, not to exceed one hundred pages in length and five thousand copies in number; one thousand copies of which shall be for the official use of the Geological Survey, one thousand five hundred copies shall be delivered to the Senate, and two thousand five hundred copies shall be delivered to the House of Representatives, for distribution."

Under this law the following papers have been published:

1. Pumping Water for Irrigation, by Herbert M. Wilson. 1896. 8°. 57 pp. 9 pl.
2. Irrigation near Phœnix, Arizona, by Arthur P. Davis. 1897. 8°. 97 pp. 31 pl.
3. Sewage Irrigation, by George W. Rafter. 1897. 8°. 100 pp. 4 pl.
4. A Reconnoissance in Southeastern Washington, by Israel Cook Russell. 1897. 8°. 96 pp. 7 pl.
5. Irrigation Practice on the Great Plains, by Elias Branson Cowgill. 1897. 8°. 39 pp. 12 pl.
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7. Seepage Waters of Northern Utah, by Samuel Fortier. 1897. 8°. 50 pp. 3 pl.
8. Windmills for Irrigation, by E. C. Murphy. 1897. 8°. 49 pp. 8 pl.
9. Irrigation near Greeley, Colorado, by David Boyd. 1897. 8°. 90 pp. 21 pl.
10. Irrigation in Mesilla Valley, New Mexico, by F. C. Barker. 1898. 8°. 51 pp. 11 pl.
11. River Heights for 1896, by Arthur P. Davis. 1897. 8°. 100 pp.
12. Underground Waters of Southeastern Nebraska, by N. H. Darton. 1898. 8°. 56 pp. 21 pl.
13. Irrigation Systems in Texas, by William Ferguson Hutson. 1898. 8°. 67 pp. 10 pl.
14. New Tests of Pumps and Water-Lifts used in Irrigation, by O. P. Hood. 1898. 8°. 91 pp. 1 pl.
15. Operations at River Stations, 1897, Part I. 1898. 8°. 100 pp.
16. Operations at River Stations, 1897, Part II. 1898. 8°. 101-200 pp.
17. Irrigation near Bakersfield, California, by C. E. Grunsky. 1898. 8°. 96 pp. 16 pl.

18. Irrigation near Fresno, California, by C. E. Grunsky. 1898. 8°. 94 pp. 14 pl.
19. Irrigation near Merced, California, by C. E. Grunsky. 1899. 8°. 59 pp. 11 pl.
20. Experiments with Windmills, by T. O. Perry. 1899. 8°. 97 pp. 12 pl.
21. Wells of Northern Indiana, by Frank Leverett. 1899. 8°. 82 pp. 2 pl.
22. Sewage Irrigation, Part II, by George W. Rafter. 1899. 8°. 100 pp. 7 pl.
23. Water-right Problems of the Bighorn Mountains, by Elwood Mead. 1899. 8°. 62 pp. 7 pl.
24. Water Resources of the State of New York, Part I, by G. W. Rafter. 1899. 8°. 99 pp. 13 pl.
25. Water Resources of the State of New York, Part II, by G. W. Rafter. 1899. 8°. 101-200 pp. 12 pl.
26. Wells of Southern Indiana (Continuation of No. 21), by Frank Leverett. 1899. 8°. 64 pp.
27. Operations at River Stations for 1898, Part I. 1899. 8°. 100 pp.
28. Operations at River Stations for 1898, Part II. 1899. 8°. 101-200 pp.
29. Wells and Windmills in Nebraska, by Erwin H. Barbour. 1899. 8°. 85 pp. 27 pl.
30. Water Resources of the Lower Peninsula of Michigan, by Alfred C. Lane. 1899. 8°. 97 pp. 7 pl.
31. Lower Michigan Mineral Waters, by Alfred C. Lane. 1899. 8°. 97 pp. 4 pl.
32. Water Resources of Puerto Rico, by Herbert M. Wilson. 1899. 8°. 48 pp. 17 pl.
33. Storage of Water on Gila River, Arizona, by Joseph B. Lippincott. 1900. 8°. 98 pp. 33 pl.
34. Geology and water resources of SE. South Dakota, by J. E. Todd. 1900. 8°. 34 pp. 19 pls.
35. Operations at River Stations, 1899, Part I. 1900. 8°. 100 pp.
36. Operations at River Stations, 1899, Part II. 1900. 8°. 101-198 pp.
37. Operations at River Stations, 1899, Part III. 1900. 8°. 199-298 pp.

In preparation:

38. Operations at River Stations, 1899, Part IV.
39. Operations at River Stations, 1899, Part V.

TOPOGRAPHIC MAP OF THE UNITED STATES.

When, in 1882, the Geological Survey was directed by law to make a geologic map of the United States, there was in existence no suitable topographic map to serve as a base for the geologic map. The preparation of such a topographic map was therefore immediately begun. About one-fifth of the area of the country, excluding Alaska, has now been thus mapped. The map is published in atlas sheets, each sheet representing a small quadrangular district, as explained under the next heading. The separate sheets are sold at 5 cents each when fewer than 100 copies are purchased, but when they are ordered in lots of 100 or more copies, whether of the same sheet or of different sheets, the price is 2 cents each. The mapped areas are widely scattered, nearly every State being represented. About 900 sheets have been engraved and printed; they are tabulated by States in the Survey's "List of Publications," a pamphlet which may be had on application.

The map sheets represent a great variety of topographic features, and with the aid of descriptive text they can be used to illustrate topographic forms. This has led to the projection of an educational series of topographic folios, for use wherever geography is taught in high schools, academies, and colleges. Of this series the first two folios have been issued, viz:

1. Physiographic types, by Henry Gannett, 1898, folio, consisting of the following sheets and 4 pages of descriptive text: Fargo (N. Dak.-Minn.), a region in youth; Charleston (W. Va.), a region in maturity; Caldwell (Kans.), a region in old age; Palmyra (Va.), a rejuvenated region; Mount Shasta (Cal.), a young volcanic mountain; Eagle (Wis.), moraines; Sun Prairie (Wis.), drumlins; Donaldsonville (La.), river flood plains; Boothbay (Me.), a fiord coast; Atlantic City (N. J.), a barrier-beach coast.
2. Physiographic types, by Henry Gannett, 1900, folio, consisting of the following sheets and 11 pages of descriptive text: Norfolk (Va.-N. C.), a coast swamp; Marshall (Mo.), a graded river; Lexington (Nebr.), an overloaded stream; Harrisburg (Pa.), Appalachian ridges; Poteau Mountain (Ark.-Ind. T.), Ozark ridges; Marshall (Ark.), Ozark Plateau; West Denver (Colo.), hogbacks; Mount Taylor (N. Mex.), volcanic peaks, plateaus, and necks; Cucamonga (Cal.), alluvial cones; Crater Lake special (Oreg.), a crater.

GEOLOGIC ATLAS OF THE UNITED STATES.

The Geologic Atlas of the United States is the final form of publication of the topographic and geologic maps. The atlas is issued in parts, or folios, progressively as the surveys are extended, and is designed ultimately to cover the entire country.

Under the plan adopted the entire area of the country is divided into small rectangular districts (designated *quadrangles*), bounded by certain meridians and parallels. The unit of survey is also the unit of publication, and the maps and descriptions of each rectangular district are issued as a folio of the Geologic Atlas.

Each folio contains topographic, geologic, economic, and structural maps, together with textual descriptions and explanations, and is designated by the name of a principal town or of a prominent natural feature within the district.

Two forms of issue have been adopted, a "library edition" and a "field edition." In both the sheets are bound between heavy paper covers, but the library copies are permanently bound, while the sheets and covers of the field copies are only temporarily wired together.

Under the law a copy of each folio is sent to certain public libraries and educational institutions. The remainder are sold at 25 cents each, except such as contain an unusual amount of matter, which are priced accordingly. Prepayment is obligatory. The folios ready for distribution are here listed.

No.	Name of sheet.	State.	Limiting meridians.	Limiting parallels.	Area, in square miles.	Price, in cents.
1	Livingston	Montana	110°-111°	45°-46°	3,354	25
2	Ringgold	Georgia Tennessee	85°-85° 30′	34° 30′-35°	980	25
3	Placerville	California	120° 30′-121°	38° 30′-39°	932	25
4	Kingston *a*	Tennessee	84° 30′-85°	35° 30′-36°	969	25
5	Sacramento	California	121°-121° 30′	38° 30′-39°	932	25
6	Chattanooga	Tennessee	85°-85° 30′	35°-35° 30′	975	25
7	Pikes Peak *a*	Colorado	105°-105° 30′	38° 30′-39°	932	25
8	Sewanee	Tennessee	85° 30′-86°	35°-35° 30′	975	25
9	Anthracite-Crested Butte.	Colorado	106° 45′-107° 15′	38° 45′-39°	465	50
10	Harpers Ferry	Virginia West Va Maryland	77° 30′-78°	39°-39° 30′	925	25
11	Jackson	California	120° 30′-121°	38°-38° 30′	938	25
12	Estillville	Virginia Kentucky Tennessee	82° 30′-83°	36° 30′-37°	957	25
13	Fredericksburg	Maryland Virginia	77°-77° 30′	38°-38° 30′	938	25
14	Staunton	Virginia West Va	79°-79° 30′	28°-38° 30′	938	25
15	Lassen Peak	California	121°-122°	40°-41°	3,634	25
16	Knoxville	Tennessee N.Carolina	83° 30′-84°	35° 30′-36°	925	25
17	Marysville	California	121° 30′-122°	39°-39° 30′	925	25
18	Smartsville	California	121°-121° 30′	39°-39° 30′	925	25
19	Stevenson	Alabama Georgia Tennessee	85° 30′-86°	34° 30′-35°	980	25
20	Cleveland	Tennessee	84° 30′-85°	35°-35° 30′	975	25
21	Pikeville	Tennessee	85°-85° 30′	35° 30′-36°	969	25
22	McMinnville	Tennessee	85° 30′-86°	35° 30′-36°	969	25
23	Nomini	Maryland Virginia	76° 30′-77°	38°-38° 30′	938	25
24	Three Forks	Montana	111°-112°	45°-46°	3,354	50
25	Loudon	Tennessee	84°-84° 30′	35° 30′-36°	969	25
26	Pocahontas	Virginia West Va	81°-81° 30′	37°-37° 30′	951	25
27	Morristown	Tennessee	83°-83° 30′		963	25
28	Piedmont	Maryland West Va	79°-79° 30′	39°-39° 30′	925	25
29	Nevada City: Nevada City Grass Valley Banner Hill	California	 121° 00′ 25″-121° 03′ 45″ 121° 01′ 35″-121° 05′ 04″ 120° 57′ 05″-121° 00′ 25″	 39° 13′ 50″-39° 17′ 16″ 39° 10′ 22″-39° 13′ 50″ 39° 13′ 50″-39° 17′ 16″	 11.65 12.09 11.65	50
30	Yellowstone National Park: Gallatin Canyon Shoshone Lake	Wyoming	110°-111°	44°-45°	3,412	75
31	Pyramid Peak	California	120°-120° 30′	38° 30′-39°	932	25
32	Franklin	Virginia West Va	79°-70° 30′	38° 30′-39°	932	25
33	Briceville	Tennessee	84°-84° 30′	36°-36° 30′	963	25
34	Buckhannon	West Va	80°-80° 30′	38° 30′-39°	932	25
35	Gadsden	Alabama	86°-86° 30′	34°-34° 30′	986	25
36	Pueblo	Colorado	104° 30′-105°	38°-38° 30′	938	50
37	Downieville	California	120° 30′-121°	39° 30′-40°	919	25
38	Butte Special	Montana	112° 29′ 30″-112° 36′ 42″	45° 59′ 28″-46° 02′ 54″	22.80	50
39	Truckee	California	120°-120° 30′	39°-39° 30′	925	25
40	Wartburg	Tennessee	84° 30′-85°	36°-36° 30′	963	25
41	Sonora	California	120°-120° 30′	37° 30′-38°	944	25
42	Nueces	Texas	100°-100° 30′	29° 30′-30°	1,035	25
43	Bidwell Bar	California	121°-121° 30′	39° 30′-40°	918	25
44	Tazewell	Virginia West Va	81° 30′-82°	37°-37° 30′	950	25
45	Boise	Idaho	116°-116° 30′	43° 30′-44°	864	25
46	Richmond	Kentucky	84°-84° 30′	37° 30′-38°	944	25
47	London	Kentucky	84°-84° 30′	37°-37° 30′	950	25
48	Tenmile District Special.	Colorado	106° 8′-106° 16′	39° 22′ 30″-39° 30′ 30″	55	25
49	Roseburg	Oregon	123°-123° 30′	43°-43° 30′	871	25
50	Holyoke	Mass Conn	72° 30′-73°	42°-42° 30′	885	50
51	Big Trees	California	120°-120° 30′	38°-38° 30′	938	25
52	Absaroka: Crandall Ishawooa	Wyoming	109° 30′-110°	44°-44° 30′	1,706	25
53	Standingstone	Tennessee	85°-85° 30′	36°-36° 30′	963	25

a Out of stock.

No.	Name of sheet.	State.	Limiting meridians.	Limiting parallels.	Area, in square miles.	Price, in cents.
54	Tacoma...........	Washington.	122°-122° 30′	47°-47° 30′	812	25
55	Fort Benton	Montana..	110°-111°	47°-48°	3,273	25
56	Little Belt Mts ...	Montana..	110°-111°	46°-47°	3,295	25
57	Telluride	Colorado..	107° 45′-108°	37° 45′-38°	236	25
58	Elmoro	Colorado..	104°-104° 30′	37°-37° 30′	950	25
59	Bristol	Virginia.. Tennessee	82°-82° 30′	36° 30′-37°	957	25
62	Menominee Special	Michigan.	87° 44′-88° 09′	45° 44′-45° 55′	254	25

STATISTICAL PAPERS.

Mineral Resources of the United States, 1882, by Albert Williams, jr. 1883. 8°. xvii, 813 pp. Price 50 cents.

Mineral Resources of the United States, 1883 and 1884, by Albert Williams, jr. 1885. 8°. xiv, 1016 pp. Price 60 cents.

Mineral Resources of the United States, 1885. Division of Mining Statistics and Technology. 1886. 8°. vii, 576 pp. Price 40 cents.

Mineral Resources of the United States, 1886, by David T. Day. 1887. 8°. viii, 813 pp. Price 50 cents.

Mineral Resources of the United States, 1887, by David T. Day. 1888. 8°. vii, 832 pp. Price 50 cents.

Mineral Resources of the United States, 1888, by David T. Day. 1890. 8°. vii, 652 pp. Price 50 cents.

Mineral Resources of the United States, 1889 and 1890, by David T. Day. 1892. 8°. viii, 671 pp. Price 50 cents.

Mineral Resources of the United States, 1891, by David T. Day. 1893. 8°. vii, 630 pp. Price 50 cents.

Mineral Resources of the United States, 1892, by David T. Day. 1893. 8°. vii, 850 pp. Price 50 cents.

Mineral Resources of the United States, 1893, by David T. Day. 1894. 8°. viii, 810 pp. Price 50 cents.

On March 2, 1895, the following provision was included in an act of Congress:

"*Provided*, That hereafter the report of the mineral resources of the United States shall be issued as a part of the report of the Director of the Geological Survey."

In compliance with this legislation the following reports have been published:

Mineral Resources of the United States, 1894, David T. Day, Chief of Division. 1895. 8°. xv, 646 pp., 23 pl.; xix, 735 pp., 6 pl. Being Parts III and IV of the Sixteenth Annual Report.

Mineral Resources of the United States, 1895, David T. Day, Chief of Division. 1896. 8°. xxiii, 542 pp., 8 pl. and maps; iii, 543-1058 pp., 9-13 pl. Being Part III (in 2 vols.) of the Seventeenth Annual Report.

Mineral Resources of the United States, 1896, David T. Day, Chief of Division. 1897. 8°. xii, 642 pp., 1 pl.; 643-1400 pp. Being Part V (in 2 vols.) of the Eighteenth Annual Report.

Mineral Resources of the United States, 1897, David T. Day, Chief of Division. 1898. 8°. viii, 651 pp., 11 pl.; viii, 706 pp. Being Part VI (in 2 vols.) of the Nineteenth Annual Report.

Mineral Resources of the United States, 1898, David T. Day, Chief of Division. 1899. 8°. viii, 616 pp.; ix, 804 pp., 1 pl. Being Part VI (in 2 vols.) of the Twentieth Annual Report.

The money received from the sale of the Survey publications is deposited in the Treasury, and the Secretary of the Treasury declines to receive bank checks, drafts, or postage stamps; all remittances, therefore, must be by MONEY ORDER, made payable to the Director of the United States Geological Survey, or in CURRENCY—the exact amount. Correspondence relating to the publications of the Survey should be addressed to—

THE DIRECTOR,
UNITED STATES GEOLOGICAL SURVEY,
WASHINGTON, D. C.

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Author.

Gannett (Henry).

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DEPARTMENT OF THE INTERIOR

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No. 172

BIBLIOGRAPHY AND INDEX OF NORTH AMERICAN
GEOLOGY, PALEONTOLOGY, PETROLOGY AND
MINERALOGY FOR 1899. WEEKS

WASHINGTON
GOVERNMENT PRINTING OFFICE
1900

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CHARLES D. WALCOTT, DIRECTOR

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FOR

THE YEAR 1899

BY

FRED BOUGHTON WEEKS

WASHINGTON
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LETTER OF TRANSMITTAL.

Department of the Interior,
United States Geological Survey,
Division of Geology,
Washington, D. C., June 12, 1900.

Sir: I have the honor to transmit herewith the manuscript of a Bibliography and Index of North American Geology, Paleontology, Petrology, and Mineralogy for the Year 1899, and to request that it be published as a bulletin of the Survey.

Very respectfully,

F. B. Weeks.

Hon. Charles D. Walcott,
Director United States Geological Survey.

BIBLIOGRAPHY AND INDEX OF NORTH AMERICAN GEOLOGY, PALEONTOLOGY, PETROLOGY, AND MINERALOGY FOR THE YEAR 1899.

By FRED BOUGHTON WEEKS.

INTRODUCTION.

The method of preparing and arranging the material of the Bibliography and Index for 1899 is similar to that adopted for the previous publications on this subject (Bulletins Nos. 130, 135, 146, 149, 156, and 162). Several papers that should have been entered in the previous bulletins are here recorded and the date of publication is given with each entry.

Bibliography.—The bibliography consists of full titles of separate papers, classified by authors, an abbreviated reference to the publication in which the paper is printed, and a brief summary of the contents, each paper being numbered for index reference. The extent of papers less than a single page in length is indicated as ⅛ p., 5 l (lines).

Index.—The subject headings, their subdivision and arrangement, are shown in the Classified Key to the Index. They comprise geographic, geologic, mineralogic, paleontologic, and petrologic subdivisions. Under Economic Geology is given a list of the useful minerals and ores described in publications examined; under Mineralogy, a list of minerals described in such publications; under Paleontology, a list of genera and species of fossils therein described, and under Petrology, a list of rocks described, reference being made in each case, by author's name and number of article in the Bibliography, to the pape. in which the fossil, mineral, or rock is described.

LIST OF PUBLICATIONS EXAMINED.

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2 **Adams** (F. D.). [Review of "Report on the geology and natural resources of the area included by the Nipissing and Temiscaming map sheets, comprising portions of the districts of Nipissing, Ontario, and of the county of Pontiac, Quebec," by A. E. Barlow.]

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3 —— Sir William Dawson.

Jour. of Geol., vol. vii, pp. 727-736, 1899.

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4 —— Sir William Dawson.

Science, new ser., vol. x, pp. 905-910, 1899.

Gives a sketch of life of Sir William Dawson.

5 **Adams** (George I.). Physiography of southeastern Kansas.

Kansas Acad. Sci., Trans., vol. xvi, pp. 53-63, pls. ii-iii, 1899.

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6 **Aguilera** (J. G.). Essai d'une evolution continentale du Mexique.

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7 **Alden** (W. C.), **Salisbury** (R. D.) and. The geography of Chicago and its environs.

See Salisbury (R. D.) and Alden (W. C.); No. 564.

8 **Ami** (Henry M.). On some Cambro-Silurian fossils from Lake Temiscaming, Lake Nipissing, and Matawa outliers.

Can. Geol. Surv., new ser., vol. x, Rept. I, Appendix II, pp. 289-302, 1899.

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9 —— On the subdivisions of the Carboniferous system in certain portions of Nova Scotia.

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Discusses the stratigraphic position of certain beds.

10 **Ami** (Henry M.). On a new and hitherto unrecognized geological horizon in the gas and oil region of western Ontario.
Can. Min. Inst., Jour., vol. ii, pp. 186–190, 2 pls., 1899.
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11 —— Progress of geological work in Canada during 1898.
Ottawa Nat., vol. xiii, pp. 52–55, 1899.
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12 —— Obituary. O. C. Marsh.
Ottawa Nat., vol. xiii, pp. 135–136, 1899.
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13 —— Bellinurus grandævus, a new species of Paleozoic limuloid crustacean recently described by Prof. T. R. Jones and Dr. Henry Woodward, from the eo-Carboniferous of Riversdale, Nova Scotia.
Ottawa Nat., vol. xiii, pp. 207–208, 1899.
Contains notes on the fossil and on the associated formations.

14 —— Report of the Geological branch [Ottawa Field-Naturalists' Club] for 1898–99.
Ottawa Nat., vol. xiii, pp. 218–223, 1899.
Contains geologic and paleontologic notes on the region in the vicinity of Ottawa.

15 —— On the geology of Wolfville, and part of the basin of Minas, Nova Scotia.
The Evangiline Journal, 3d edition, 1899.
Rockwell & Co., Wolfville, Nova Scotia. (Not seen.)

16 **Anderson** (F. M.). The geology of Point Reyes Peninsula [California].
Cal., Univ. of., Dept. of Geol., Bull., vol. ii, No. 5, pp. 119–153, pl. iv, 1899.
Describes the character of the granitic rocks and of the Franciscan and Miocene sediments, and the physiographic and dynamic history of the region.

17 **Ashley** (George Hall). The coal deposits of Indiana.
Ind. Dept. of Geol. and Nat. Res., 23d Ann. Rept., pp. 1–1428, coal maps, sheets A–G, 89 sketch maps, pls. i–lxxix, 1899. Abstract: Mines and Minerals, vol. xx, pp. 202–205, 1899.
Describes general geologic and geographic occurrence and distribution of coal, the general geology of the Coal Measures of Indiana, and the detailed geology in various counties.

B.

18 **Babcock** (E. J.). Coal in North Dakota.
Mines and Minerals, vol. xix, p. 254, 1899.
Describes character and occurrence of the coal.

19 **Bagg** (R. M., jr.). The Cretaceous Foraminifera of New Jersey.
Abstract: Am. Geol., vol. xxiii, p. 126 (⅓ p.), 1899.
See Bibliography and Index for 1898, No. 27.

20 **Bailey** (L. W.). The mineral resources of the Province of New Brunswick.

Can. Geol. Surv., new ser., vol. x, Rept. M, 129 pp., 1 map, 2 pls., 1898.

Describes the occurrence of iron, copper, nickel, antimony, lead, silver, gold, manganese, coal, gypsum, and other economic products.

21 **Bain** (Harry Foster). Geology of Carroll County [Iowa].

Iowa Geol. Surv., vol. ix, pp. 53–107, pl. ii, 11 figs. and geologic map, 1899.

Describes the physiography and the occurrence and character of the Carboniferous, Cretaceous, and Pleistocene deposits, and of coal, clays, and water supply.

22 —— Notes on the drift of northwestern Iowa.

Am. Geol., vol. xxiii, pp. 168–176, 1899.

Describes the character and distribution of morainic drift, covering probable Kansan drift.

23 —— The Dubuque lead and zinc mines [Iowa].

Mines and Minerals, vol. xx, pp. 10–12, 4 figs., 1899.

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24 —— The western interior coal field of America.

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25 —— [Review of "Iron making in Alabama," by W. B. Phillips.]

Jour. of Geol., vol. vii, pp. 213–214 (½ p.), 1899.

26 —— [Review of "Special report on gypsum and gypsum-cement plasters," by G. P. Grimsley and E. H. S. Bailey.]

Jour. of Geol., vol. vii, pp. 625–627, 1899.

27 —— [Review of "American cements," by Uriah Cummings.]

Jour. of Geol., vol. vii, p. 627 (½ p.), 1899.

28 —— and **Leonard** (A. G.). Middle Coal Measures of the Western interior coal fields.

Abstract: Geol. Soc. Am. Bull., vol. x, pp. 10–12, 1899.

See Bibliography and Index for 1898, No. 45.

29 **Barbour** (Erwin Hinckley). Wells and windmills in Nebraska.

U. S. Geol. Surv., Water-Supply Paper No. 29, 85 pp. 27 pls., 25 figs. 1899.

Gives a sketch of the general subject of water supply.

30 —— The rapid decline of geyser phenomena in the Yellowstone National Park.

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31 **Barbour** (Edwin Hinckley) and **Knight** (W. C.). The discovery of new invertebrates in the Dinosaur beds of Wyoming.

Abstracts: Science, new ser., vol. x, p. 490 (¼ p.); Am. Assoc. Adv. Sci., Proc.. vol. xlviii, pp. 229–230 (9 1), 1899.

32 **Barlow** (Alfred Ernest). Report on the geology and natural resources of the area included by the Nipissing and Temiscaming map sheet, comprising portions of the district of Nipissing, Ontario, and of the county of Pontiac, Quebec.

Can. Geol. Surv., new ser., vol. x, Rept. I, 287 pp., 2 maps, 5 pls., 1899.
Review: Jour. of Geol., vol. vii, pp. 713–717, 1899.

Describes the physiography, the character and occurrence of the Archean rocks, Ordovician and Silurian strata, the petrographic character of the igneous rocks, the glacial deposits and occurrence of gold and silver.

33 —— On the origin of some Archæan conglomerates.

Ottawa Nat., vol. xii, pp. 205–217, pls. vi–ix, 1899.

Discusses origin of certain pseudo-conglomerates of the Grenville and Hastings series of Ontario.

34 **Barnard** (Charles). Some recent changes in the shore line of Nantucket [Massachusetts].

Abstract: Science, new ser., vol. x, p. 895 (¾ p.), 1899.

35 **Barnard** (E. C.). Report of the Fortymile expedition [Alaska].

U. S. Geol. Surv., Expl. in Alaska, pp. 76–84, 1899.

Describes physiography and occurrence of gold.

36 **Barrois** (Charles). Notice sur James Hall.

Soc. Géol. de France; Bull., 3d ser., vol. xxvii, pp. 168–173, 1899.

37 **Bascom** (Florence). The dike rocks [slate belt of New York and Vermont].

U. S. Geol. Surv., 19th Ann. Rept., Pt. III, pp. 223–226, 1899.

Describes the petrographic characters of certain dike rocks of the region.

38 —— [Review of "Maryland Geological Survey, vol. ii."]

Am. Geol., vol. xxiii, pp. 193–195, 1899.

39 —— On some dikes in the vicinity of Johns Bay, Maine.

Am. Geol., vol. xxiii, pp. 275–280, pls. viii–xi, 1899.

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40 **Bayley** (William Shirley). The Sturgeon River tongue [Michigan].

U. S. Geol. Surv., Mon. XXXVI, pp, 458–487, pls. li–liii; 19th Ann. Rept., Pt. III, pp. 146–151, 1899.

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41 **Beecher** (Charles E.). Othniel Charles Marsh.

Am. Jour. Sci., 4th ser., vol. vii, pp. 403–428; Am. Geol., vol. xxiv, pp. 135–157, 1899.

Gives a sketch of Professor Marsh's life and work, and a chronologic list of his publications.

42 —— [Review of "The Cretaceous Foraminifera of New Jersey," by R. M. Bagg, jr.]

Am. Geol., vol. xxiii, p. 126 (⅛ p.), 1899.

43 **Beede** (J. W.). Descriptions of some new forms of Pseudomonotis from the Upper Coal Measures of Kansas.

Kansas Univ. Quart., vol. viii, pp. 79–84, pls. xviii–xix, 1898.

44 —— New fossils from the Kansas Coal Measures.

Kansas Univ. Quart., vol. viii, pp. 123–130, pls. xxxii–xxxiii, 1899.

45 —— On the correlation of the Coal Measures of Kansas and Nebraska.

Kan. Acad. Sci., Trans., vol. xvi, pp. 70–84, 1899.

Reviews the literature on the subject, gives sections at the localities, and discusses their relations.

46 —— and **Rogers** (Austin F.). New and little known pelecypods from the Coal Measures.

Kansas Univ. Quart., vol. viii, pp. 131–134, pl. xxxiv, 1899.

47 **Bell** (Robert). Rising of land around Hudson Bay.

Smith Inst., Ann. Rept. for 1897, pp. 359–367, 1898.

48 —— Outline of geology of Hudson Bay and Strait.

Abstracts: Science, new ser., vol. ix, pp. 101–102; Am. Geol., vol. xxiii, pp. 92–93, 1899.

49 **Beyer** (Samuel Walker). Geology of Story County [Iowa].

Iowa Geol. Surv., vol. ix, pp. 159–237, pls. iii–iv, figs. 16–29, and geologic map, 1899.

Describes the physiography and drainage, the character and occurrence of the Carboniferous and Pleistocene subdivisions and wind deposits, and the occurence of coal, clays, and other economic products.

50 —— Buried loess in Story County [Iowa].

Iowa Acad. Sci., Proc., vol. vi, pp. 117–121, 1899.

Describes occurrence and gives list of fossils.

51 **Blake** (William P.). The Pliocene skull of California and the flint implements of Table Mountain.

Jour. of Geol., vol. vii, pp. 631–637, 1899.

Discusses bearing on the antiquity of man.

52 —— Hübnerite in Arizona.

Am. Inst. Min. Engrs., Trans., vol. xxviii, pp. 543–546, fig. 1, 1899.

Describes character and occurrence of the material.

53 **Blake** (William P.). The occurrence and production of wolframite in Arizona.
The Mineral Industry for 1898, vol. vii, pp. 720-722, 1899.
Describes character and occurrence in Arizona.

54 **Blue** (Archibald). Corundum in Ontario.
Can. Inst., Proc., new ser., vol. ii, pp. 15-22; Ont. Bur. of Mines, vol. viii, pp. 241-249, 1899.
Contains notes on occurrence of corundum.

55 —— Corundum in Ontario.
Am. Inst. Min. Engrs., Trans., vol. xxviii, pp. 565-578, 1899.
Gives a historical sketch of corundum and describes discovery and occurrence in Ontario.

56 **Böse** (Emilio). Geologia de los Alrededores de Orizaba con un perfil de la vertiente oriental de la mesa central de Mexico.
Mex. Inst. Geol., Bull., No. 13, pp. 1-52, 2 pls., 4 figs., and sheet of cross sections, 1899.
Describes the character, occurrence, and fauna of the Cretaceous rocks, and physiography and structure of Central Mexico.

57 **Bow** (James A.). Lower Seine gold mines [Ontario].
Ont. Bur. of Mines, vol. viii, pp. 263-274, 1899.
Describes occurrence of gold.

58 **Bownocker** (J. A.). A deep pre-Glacial channel in western Ohio and eastern Indiana.
Am. Geol., vol. xxiii, pp. 178-182, pl. vi, 1899.
Describes the drift covering of the region and the course of the pre-Glacial river.

59 **Branner** (J. C.) [Review of "The Upper Silurian fauna of the Rio Trombetas, State of Para, Brazil," and "Devonian mollusca of the State of Para, Brazil," by John M. Clarke.]
Jour. of Geol., vol. vii, pp. 813-814, 1899.

60 **Brewer** (William M.). The west coast of Vancouver Island [British Columbia].
Eng. and Min. Jour., vol. lxvii, p. 176, 1899.
Describes occurrence of ore deposits in the region.

61 —— Mining on Vancouver and Texada Islands [British Columbia].
Eng. and Min. Jour., vol. lxvii, pp. 529-530, 1899.
Describes occurrence of ore bodies in the region.

62 —— Leech River, Alberni and Skirt Mountain [British Columbia].
Eng. and Min. Jour., vol. lxviii, p. 36, 1899.
Describes gold ores of the region.

63 —— Windemere mining division, East Kootenay district [British Columbia].
Eng. and Min. Jour., vol. lxviii, pp. 127-128, 1899.
Describes general geology and occurrence of copper ores.

64 **Brewer** (William M.). The copper deposits of Vancouver Island.
Can. Min. Rev., vol. xviii, pp. 270–271, 1899.

65 **Britton** (Elizabeth G.). A new Tertiary fossil moss.
Torrey Bot. Club., Bull., vol. xxvi, No. 2, pp. 79–81, 1 fig.; The Plant World, vol. ii, pp. 108–109, 1899.
Describes a new species from Kittitas County, Washington

66 **Broadhead** (G. C.). Biographical sketch of George Clinton Swallow.
Am. Geol., vol. xxiv, pp. 1–6, pl. i, 1899.
Gives a sketch of his life and a list of his publications.

67 **Brock** (R. W.). West Kootenay ore bodies [British Columbia].
Can. Min. Rev., vol. xviii, pp. 61–64; Min. and Sci. Press, vol. lxxix, pp. 201, 230–231; Can. Min. Inst. Jour., vol. ii, pp. 72–86, 1899.
Describes the general geologic features of the region and occurrence of gold and silver.

68 **Brook** (W. M.). The Atlin district in British Columbia.
Eng. and Min. Jour., vol. lxviii, pp. 605–606, 1899.
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69 **Brooks** (Alfred H.). The Yukon district [Alaska].
U. S. Geol. Surv., Expl. in Alaska, pp. 85–100, 1899.
Describes the physiography and drainage, the general geologic features, and occurrence of gold.

70 —— The coast from Point Barrow to the Mackenzie [Alaska].
U. S. Geol. Surv., Expl. in Alaska, pp. 130–132, 1899.
Describes physiography of the region.

71 —— Notes on the geology of the Tanana and White river basins, Alaska.
Abstract: Science, new ser., vol. ix, p. 622, 1899.

72 —— **Peters** (W. J.) and. Report on the White River-Tanana expedition [Alaska].
See Peters (W. J.) and Brooks (A. H.), No. 524.

73 **Buckley** (Ernest Robertson). On the building and ornamental stones of Wisconsin.
Wis. Geol. and Nat. Hist. Surv., Bull., No. iv, econ. ser. No. 2, 500 pp., pls. i–lxix, figs. 1–4, 1898.
Describes the occurrence and character of the building and ornamental stones derived from the igneous and sedimentary formations of Wisconsin.

74 —— [Review of "Report on the building and decorative stones of Maryland," by George P. Merrill and Edward B. Mathews.]
Jour. of Geol., vol. vii, pp. 206–209, 1899.

75 **Burr** (H. T.). A drainage peculiarity in Androscoggin County, Maine.

Am. Geol., vol. xxiv, pp. 369–371, 1899. Abstract: Science, new ser., vol. ix, p. 519 (¼ p.), 1899.

Describes a peculiar lake delta formation.

76 **Bush** (Katherine J.). [Review of "Synopsis of the Recent and Tertiary Leptonacea of North America and the West Indies, by W. H. Dall."]

Science, new ser., vol. x, pp. 249–251, 1899.

77 **Bushong** (F. W.). The deep well at Madison, Kansas.

Kan. Acad. Sci., Trans., vol. xvi, pp. 67–70, 1899.

Gives a section of the well.

C.

78 **Calvin** (Samuel). Iowan drift.

Geol. Soc. Am., Bull., vol. x, pp. 107–120, 1899.

Describes character and distribution of the Iowan drift, and compares with other drift formations.

79 —— A notable ride. From driftless area to Iowan drift.

Am. Geol., vol. xxiv, pp. 372–376, 1899.

Describes the character and origin of certain topographic features in Iowa.

80 **Campbell** (Marius R.). Standingstone folio, Tennessee.

U. S. Geol. Surv., Geol. Atlas of U. S., folio No. 53, 1899.

Describes the general physiographic and geologic features, the character and occurrence of the Silurian, Devonian, and Carboniferous rocks, and the occurrence of coal in the quadrangle. Includes topographic, geologic, and economic maps and structure sections.

81 **Carter** (O. C. S.). Coastal topography of the United States.

Phil. Eng. Club., Proc., vol. xvi, pp. 275–303, 1899. (Not seen.)

82 **Case** (E. C.). The development and geological relations of the Vertebrates, Part V, Mammalia (Continued).

Jour. of Geol., vol. vii, pp. 163–187, 1899.

Describes geologic and geographic distribution of Equidæ, Lophiodontidæ, Suidæ, Tapiridæ, Oreodontidæ, and other groups.

83 **Castleman** (J. W.). The brown iron ore mines near Leeds, in Jefferson County [Alabama].

Ala. Ind. and Sci. Soc., Proc., vol. ix, pp. 13–18, 1899.

Describes the geologic features of the region and occurrence of the iron ores.

84 **Catlett** (Charles). The iron ores of the Potsdam formation in the Valley of Virginia.

Abstract: Eng. and Min. Jour., vol. lxviii, pp. 157–158, 1899.

85 **Chamberlin** (T. C.). An attempt to frame a working hypothesis of the cause of Glacial periods on an atmospheric basis.
Jour. of Geol., vol. vii, pp. 545–584, 667–685, 751–787, 1899.
Describes the characteristics of this hypothesis and its application to known Glacial and interglacial epochs.

86 —— [Review of "A preliminary report on the artesian well system of Georgia," by S. W. McCallie].
Jour. of Geol., vol. vii, p. 722 (½ p.), 1899.

87 —— Lord Kelvin's address on the age of the earth as an abode fitted for life.
Science, new ser., vol. ix, pp. 889–901, vol. x, pp. 11–18, 1899.

88 **Chalmers** (Robert). Report on the surface geology and auriferous deposits of southeastern Quebec.
Can. Geol. Surv., new ser., vol. x, Rept. J, 160 pp. 1 map, 2 pls., 1898.
Describes the physiography and drainage, the character and distribution of the glacial and superficial deposits, and the occurrence of gold.

89 **Charlton** (W. A., jr.). Goulais River to Dalton [Ontario].
Ont. Bur. of Mines, vol. viii, pp. 197–204, pls. 21–27, 1899.
Describes the general geologic and physiographic features.

90 **Clark** (W. B.). The relations of Maryland topography, climate, and geology to highway construction.
Md. Geol. Surv., vol. iii, pp. 47–106, pls. iii–xi, figs. 1–3, 1899.

91 —— [Review of "Revised text book on geology," by J. D. Dana, edited by Wm. North Rice].
Science, new ser., vol. ix, p. 147, 1899.

92 **Clarke** (F. W.). [Chemical composition of roscoelite.]
Am. Jour. Sci., 4th ser., vol. vii, pp. 454–455, 1899. Review: Am. Geol., vol. xxiv, p. 318 (¼ p.), 1899.

93 —— Constitution of tourmaline.
Am. Jour. Sci., 4th ser., vol. viii, pp. 111–121, 1899. Review: Am. Geol., vol. xxiv, pp. 318–319, 1899.

94 —— The alkaline reaction of some natural silicates.
Review: Am. Geol., vol. xxiii, p. 328 (7 l.), 1899.

95 —— and **Darton** (N. H.). Hydromica from New Jersey.
Am. Jour. Sci., 4th ser., vol. vii, pp. 365–366, 1899. Review: Am. Geol., vol. xxiv, p. 182 (¼ p.), 1899.
Describes occurrence of chemical characters of the material.

96 **Clarke** (John M.). The Naples fauna (fauna with Mantioceras intumescens) in western New York.
N. Y. Geol. Surv., 16th Ann. Rept., pp. 29–162, 9 pls., 106 figs., 1899.
Describes the geologic relations and vertical range of the genera and species.

97 **Clarke** (John M.). Notes on the early stages of certain Goniatites.

N. Y. Geol. Surv., 16th Ann. Rept., pp. 163–170, 7 figs., 1899.

98 —— Upper Silurian fauna of the Rio Trombetas, State of Para, Brazil, and Devonian mollusks from the State of Para, Brazil.

Archivos do Museu Nacional do Rio de Janeiro, vol. x. Review: Am. Geol., vol. xxiv, pp. 311–317, 1899.

99 —— Geological time.

Science, new ser., vol. x, pp. 695, 1899.

Describes certain methods previously employed by which to estimate geologic time.

100 —— (a) Paropsonema: A peculiar echinoderm from the Intumescens fauna, New York. (b) Remarkable occurrence of Orthoceros in the Oneonta sandstones of New York. (c) The Squaw Island "Water biscuit," Canandaigua Lake, New York.

Abstracts: Am. Assoc. Adv. Sci., Proc., vol. xlviii, p. 226 (¼ p.); Science, new ser., vol. x, pp. 488–489 (⅓ p.), 1899.

101 —— and **Schuchert** (Charles). The nomenclature of the New York series of geological formations.

Science, new ser., vol. x, pp. 874–878, 1899.

Discusses the applications which have been made of the subdivisions of the New York series, and proposes a series of names derived from characteristic New York localities.

102 —— **Hall** (J.) and. A memoir on the Paleozoic reticulate sponges constituting the family Dictyospongidæ, Part I.

See Hall (J.) and Clarke (J. M.), Nos. 275 and 276.

103 —— —— A memoir on the Paleozoic reticulate sponges constituting the family Dictyospongidæ, Part II.

See Hall (J.) and Clarke (J. M.), Nos. 275 and 277.

104 **Clements** (J. Morgan). Contributions to the study of contact metamorphism.

Am. Jour. Sci., 4th ser., vol. vii, pp. 81–90. Abstracts: Am. Geol., vol. xxiv, pp. 254–255; Am. Nat., vol. xxxiii, pp. 551–552, 1899.

Describes contact metamorphism of Mansfield slates in the upper peninsula of Michigan.

105 —— and **Smyth** (H. L.). The Crystal Falls iron-bearing district of Michigan. With a chapter on the Sturgeon River tongue by W. S. Bayley, and an introduction by C. R. Van Hise.

U. S. Geol. Surv., Mon. XXXVI, 512 pp., 53 pls., 24 figs.; 19th Ann. Rept., Pt. III, pp. 19–151, pls. i–xi, figs. 1–6, 1899. Review: Am. Geol., vol. xxiv, pp. 308–311, 1899.

Describes the physiography of the region and the occurrence and character of the Archean and Algonkian formations and of the iron-ore deposits. Includes geologic maps.

106 **Coleman** (Arthur P.). Lake Iroquois and its predecessor at Toronto [Canada.]

Geol. Soc. Am. Bull., vol. x, pp. 165–176, 1899. Abstracts: Am. Geol., vol. xxxiii, pp. 103–104 (½ p.); Science, new ser., vol. ix, pp. 143–144, 1899.

Describes glacial features of the region.

107 —— A new analcite rock from Lake Superior.

Jour. of Geol., vol. vii, pp. 431–436, 1899.

Describes the occurrence and petrographic and chemical characters.

108 —— Corundiferous nepheline syenite from eastern Ontario.

Jour. Geol., vol. vii, pp. 437–444, 1899.

Describes occurrence and petrographic character.

109 —— Copper regions of the upper lakes [Ontario].

Ont. Bur. of Mines, vol. viii, pp. 121–174, 12 pls., 1899.

Describes the general physiographic and geologic features of the region and the character and occurrence of the Archean rocks and Algonkian and Pleistocene deposits. Includes notes on the petrographic characters of the igneous rocks.

110 —— Corundiferous nephelite syenite.

Ont. Bur. of Mines, vol. viii, pp. 250–253, 1899.

Describes character and occurrence in Ontario.

111 —— Copper in Parry Sound district [Ontario].

Ont. Bur. of Mines, vol. viii, pp. 259–262, 1899.

Describes character and occurrence of copper ores.

112 —— and **Willmott** (A. B.). Michipicoton iron range.

Ont. Bur. of Mines, vol. viii, pp. 254–258, 1899.

Describes occurrence of iron in the region.

113 **Colquhoun** (A. J.). Notes on occurrence of quicksilver in Canada.

Can. Min. Inst. Jour., vol. ii, pp. 13–16; Can. Min. Rev., vol. xviii, pp. 41–42; Min. and Sci. Press, vol. lxxix, p. 288, 1899.

114 **Comely** (V. R. de). The gold resources of Mexico.

Eng. and Min. Jour., vol. lxvii, pp. 320–321, 348, 1899.

Describes general occurrence of auriferous veins and placers.

115 **Cooper** (A. S.). The genesis of petroleum and asphaltum in California.

Cal. State Min. Bureau Bull., No. 16, 89 pp., 29 figs., 1899.

116 —— The genesis of petroleum and asphaltum in California.

Min. and Sci. Press, vol. lxxviii, pp. 124, 149, 182, 205 (2 figs.), 236 (1 fig.), 264 (2 figs.), 289–290 (1 fig.), 320 (1 fig.), 344 (2 figs.), 377 (1 fig.), 401–402, 432 (1 fig.), 460 (1 fig.), 1899.

Describes occurrence and discusses origin.

117 **Cooper** (A. S.). Phenomena accompanying the accumulations of bitumen.

Min. and Sci. Press, vol. lxxix, pp. 632–633 (3 figs.), 665 (3 figs.). 691 (1 fig.), 721, 1899.

Describes occurrences.

118 **Cope** (Edward D.). Vertebrate remains from Port Kennedy bone deposit [Pennsylvania].

Phil. Acad. Nat. Sci. Jour., 2nd ser., vol. xi, pt. ii, pp. 193–267, pls. xix–xxi, 1899.

119 **Crook** (A. R.). Oliver Marcy, LL. D.

Am. Geol., vol. xxiv, pp. 67–72, pl. iv, 1899.

Gives a sketch of Professor Marcy's life.

120 **Crosby** (W. O.). Archean-Cambrian contact near Manitou, Colorado.

Geol. Soc. Am., Bull., vol. x, pp. 141–164, pls. xiv–xviii, 38 figs. 1899. Abstracts: Am. Geol., vol. xxiii, p. 92; Science, new ser., vol. ix, p. 101 (½ p.), 1899.

Describes the contact, the structural features, modes of erosion, and the relation of the form of the contacts and the character of the overlying sediments.

121 —— Geology of the Wachusett dam and Wachusett aqueduct tunnel of the Metropolitan waterworks in the vicinity of Clinton, Massachusetts.

Tech. Quart., vol. xii, pp. 68–96, 10 figs., 1899.

Describes the character and occurrence of the sedimentary and igneous rocks and structure features of the region.

122 —— Geological history of the Nashua Valley during the Tertiary and Quaternary periods.

Tech. Quart., vol. xii, pp. 288–324, 4 pls., 1899.

Describes the physiography and character of the Tertiary and Pleistocene drainage.

123 —— [Review of "The genesis of bitumens as related to chemical geology," by S. F. Peckham.]

Am. Geol., vol. xxiii, p. 327 (4 l.), 1899.

124 —— [Review of "Notes on North Carolina minerals," by J. H. Pratt.]

Am. Geol., vol. xxiii, pp. 325–326, (½ p.), 1899.

125 —— [Review of "The origin and chemical composition of petroleum," by S. P. Sadtler, S. F. Peckham, David T. Day, Francis C. Phillips, and Charles F. Mabery.]

Am. Geol., vol. xxiii, pp. 326–327, 1899.

126 **Crosby** (W. O.). [Review of "Origin of grahamite," by I. C. White; "A contribution to the study of contact metamorphism," by J. Morgan Clements; "The petrographical province of Essex County, Mass.," by H. S. Washington; and "A contribution to the geology of the pre-Cambrian igneous rocks of the Fox River Valley, Wisconsin," by Samuel Weidman.]

Am. Geol., vol. xxiv, pp. 253–257, 1899.

127 —— The glacial lake of Nashua Valley.

Abstracts: Am. Geol., vol. xxiii, pp. 102–103 (½ p.); Science, new ser., vol. ix, p. 106 (⅓ p.), 1899.

128 **Cross** (Whitman). Telluride folio, Colorado.

U. S. Geol. Survey, Geol. Atlas of U. S., folio No. 57, 1899.

Describes the general physiography and geology of the San Juan region, and the occurrence and character of the Algonkian, Juratrias, Cretaceous, Tertiary, and igneous rocks of the quadrangle and discusses the geologic history. Includes topographic and geologic maps, columnar sections, and special illustrations.

129 —— See **Hill** (R. T.). No. 313.

130 **Cummings** (Uriah). American cements.

Rogers and Manson, Boston, 299 pp., 1898. Review: Jour. of Geol., vol. vii, p. 627 (½ p.), 1899.

131 **Curtis** (G. C.) and **Woodworth** (J. B.). Nantucket, a morainal island.

Jour. of Geol., vol. vii, pp. 226–236, 5 figs., 1899.

Describes the physiographic, glacial, and general geologic features of the region.

132 **Cushing** (H. P.). Augite-syenite gneiss near Loon Lake, New York.

Geol. Soc. Am., Bull., vol. x, pp. 177–192, pls. 19–20, 1899. Abstracts: Am. Geol., vol. xxiii, pp. 106, 330–331; Science, new ser., vol. ix, p. 141, 1899.

Describes megascopic, microscopic, and chemical character of the gneiss and its occurrence in the petrographic provinces. Discusses sequence of eruptions in the Adirondacks.

133 —— Report on the boundary between the Potsdam and pre-Cambrian rocks of the Adirondacks [New York].

N. Y. Geol. Surv., 16th Ann. Rept., pp. 5–27, 1 pl., 2 figs. 1899. Review: Am. Geol., vol. xxiii, p. 330, 1899.

Describes the geologic history and local geologic features of the region.

D.

134 **Dale** (T. Nelson). The slate belt of eastern New York and western Vermont.

U. S. Geol. Surv., 19th Ann. Rept., Pt. III, pp. 153–300, pls. xii–xli, figs. 7–16, 1899.

Describes the physiography, the occurrence, and character and structure of the Cambrian and Ordovician beds, the chemical composition of the slates, and the economic geology of the region. Includes a bibliography of the subject.

135 **Dall** (Wm. H.) Synopsis of the Recent and Tertiary Leptonacea of North America and the West Indies.
U. S. Nat. Mus., Proc., vol. xxi, pp. 873–897, pls. lxxxvii–lxxxviii, 1899.

136 **Daly** (R. A.). On the optical characters of the vertical zone of amphiboles and pyroxenes; and on a new method of determining the extinction angles of these minerals by means of cleavage planes.
Am. Acad. Arts and Sci., Proc., vol. xxxiv, pp. 309–323, pls. i–iii, 1899.

137 —— On a new variety of hornblende.
Am. Acad. Arts and Sci., Proc., vol. xxxiv, pp. 431–437, 1899.

138 —— The peneplain. A review.
Am. Nat., vol. xxxiii, pp. 127–138, 1899.
Discusses Professor Tarr's criticisms of the peneplain theory.

139 **Darton** (Nelson Horatio). Preliminary report on the geology and water resources of Nebraska west of the one hundred and third meridian.
U. S. Geol. Surv., 19th Ann. Rept., Pt. IV, pp. 719–785, pls. lxxiv–cxviii, figs. 208–230, 1899.
Describes the physiography, the character and occurrence of the Pleistocene, Tertiary, and Cretaceous strata and of the underground waters.

140 —— The bad lands of South Dakota.
Nat. Geog. Mag., vol. x, pp. 339–343, 3 pls., 1899.
Describes the general geologic and physiographic features of the region.

141 —— Fossil fish in Jurassic of Black Hills.
Abstracts: Am. Geol., vol. xxiii, p. 93 (4 l.), 1899; Science, new ser., vol. ix, p. 103 (7 l.), 1899.

141*a* —— Mesozoic stratigraphy in southwestern Black Hills.
Abstracts: Am. Geol., vol. xxiii, p. 94 (⅓ p.), 1899; Science, new ser., vol. ix, p. 103 (⅓ p.), 1899.

141*b* —— Relations of Tertiary formations in western Nebraska region.
Abstracts: Am. Geol., vol. xxiii, p. 94 (½ p.), 1899; Science, new ser., vol. ix, p. 103 (5 l.), 1899.

141*c* —— Shore line of Tertiary lakes on slope of the Black Hills.
Abstracts: Am. Geol., vol. xxiii, p. 94 (9 l.), 1899; Science, new ser., vol. ix, p. 103 (8 l.), 1899.

142 —— **Clarke** (F. W.) and. Hydromica from New Jersey.
See Clarke (F. W.) and Darton (N. H.), No. 95.

143 **Davis** (H. J.). Modification in the Jonathan Creek drainage basin [Ohio.]
Denison Univ., Sci. Lab. Bull., vol. xi, art. viii, pp. 163–165, pls. xxv–xxvi, 1899.
Describes the physiographic features of the region.

144 **Davis** (W. M.). The peneplain.
Am. Geol., vol. xxiii, pp. 207-239, pl. vii, 1899.
Discusses evidences bearing on the existence of peneplains.

145 **Davison** (J. M.). Platinum and iridium in meteoric iron.
Am. Jour. Sci., 4th ser., vol. vii, p. 4, 1899. Review: Am. Geol., vol. xxiii, p. 327 (9 l.), 1899.

146 **Dawson** (George M.). Summary report of the Geological Survey department [Canada] for the year 1897.
Can. Geol Surv., new ser., vol. x, Rept. A, 156 pp. and map, 1898.
Contains a general summary of the operations of the survey and of the annual reports of the several geologists.

147 —— Summary report of the Geological Survey department of [Canada] for the year 1898.
Can. Geol. Surv., 208 pp., 1899. Review: Am. Geol., vol. xxiii, pp. 384-385,1899.

148 —— The coals of the Canadian northwest and Rocky Mountain region.
The Mineral Industry for 1898, vol. vii, pp. 198-201, 1899.
Describes occurrence and distribution.

149 —— A remarkable landslip on the Riviere Blanche, Port Neuf Co., Quebec.
Abstracts: Am. Geol., vol. 23, p. 103 (½ p.); Science, new ser., vol. ix, p. 139 (9 l.), 1899.

150 —— Duplication of geologic formation names.
Science, new ser., vol. ix, pp. 592-593, 1899.
Discusses use of the name Cache Creek formation.

151 **Dawson** (Sir J. William). Note on an echinoderm collected by Dr. Ami at Bessrers, Ottawa River, in the Pleistocene (Leda clay).
Ottawa Nat., vol. xiii, pp. 201-202, 1899.
Contains notes on a specimen representing a species of Spatangus or Brissus.

152 —— Addendum to a note of Nova Scotia Carboniferous Entomostraca in number for January, 1897.
Can. Rec. Sci., vol. vii, p. 396, fig. 10, 1898.
Gives figure of Carbonia rankiniana.

153 **Day** (David T.). Mineral Resources of the Antilles, Hawaii, and the Philippines.
Eng. Mag., vol. xvii, pp. 242-251, 1899.
Gives a general account of the mineral resources of these islands.

154 **Day** (William C.). The coal and pitch coal of the Newport mine [Oregon].
U. S. Geol. Surv., 19th Ann. Rept., Pt. III, pp. 370-376, 1899.
Discusses the character and origin of certain portions of these coal beds.

155 **Day** (William C.). See **Taff** (J. A.). No. 617.

156 **Dickhaut** (Henry E.). Collecting fossils in the Cincinnati shales.
Am. Geol., vol. xxiii, pp. 335–336, 1899.
Contains notes on the occurrence of fossils in these shales and recommendations as to the best part of the year to collect fossils from this region.

157 **Diller** (Joseph Silas). The Coos Bay coal field, Oregon.
U. S. Geol. Surv., 19th Ann. Rept., Pt. III, pp. 309–376, pls. xliii–liv, figs. 17–76, 1899.
Describes the topographic and geologic features of the region and the occurrences and character of the coals.

158 —— Origin of Paleotrochis.
Am. Jour. Sci., 4th ser., vol. vii, pp. 337–342, 1899. Review: Am. Geol., vol. xxiv, p. 182 (½ p.), 1899.
Describes microscopic characters of the material and origin of the Paleotrochis structure.

159 —— Crater Lake, Oregon.
Smith. Inst., Ann. Rept. for 1897, pp. 369–379, pls. ii–xvi, 1898.

160 —— Latest volcanic eruption on the Pacific coast.
Science, new ser., vol. ix, pp. 639–640, 1899.
Describes material from Mount St. Helens, Washington.

161 —— The educational series of rock specimens collected and distributed by the United States Geological Survey.
Abstract: Am. Geol., vol. xxiii, pp. 61–62, 1899.

162 **Domenech** (Manuel Victor). [Mineral resources of Porto Rico.]
Mines and Minerals, vol. xix, pp. 529–532, 1 fig., 1899.
Describes occurrence of gold, silver, copper, and iron.

163 **Donald** (J. T.). A notable Canadian deposit of chromite.
Can. Min. Inst., Jour., vol. ii, pp. 25–27, 1899; Can. Min. Rev., vol. xviii, pp. 40–41, 1899.
Contains notes on occurrence.

164 **Douglas** (James). The Copper Queen mine, Arizona.
Min. and Sci. Press, vol. lxxix, pp. 432–433, 2 figs., 1899.

165 **Douvillé** (M. H.). Sur l'âge des couches traversées par le canal de Panama.
Soc. Géol de France, Bull., 3d ser., vol. xxvi, pp. 587–600, 1898.

E.

166 **Eakle** (Arthur S.). Topaz crystals in the mineral collection of the U. S. National Museum.
U. S. Nat. Mus. Proc., vol. xxi, pp. 361–369, 22 figs., 1899; published in 1898.
Describes crystallographic characters.

167 **Eastman** (C. R.). Descriptions of new species of Diplodus teeth from the Devonian of northeastern Illinois.

Jour. of Geol., vol. vii, pp. 489-493, pl. vii, 1899.

Describes two new species of Diplodus.

168 **Eckel** (E. C.). Intrusives in the Inwood limestone of Manhattan Island.

Am. Geol., vol. xxiii, pp. 122-124, pl. iii, 1899.

Describes the relations of the formations and the character and occurrence of the intrusives.

169 **Ehrenfeld** (Frederick). A study of the igneous rocks at York Haven and Stony Brook, Pa., and their accompanying formations.

Thesis presented to the faculty of the department of philosophy of the University of Pennsylvania, 24 pp., 1 pl., 1898. (Not seen.)

170 **Eldridge** (George H.). The extreme southeastern coast. The coast from Lynn Canal to Prince William Sound [Alaska].

U. S. Geol. Surv., Expl. in Alaska, pp. 101-104, 1899.

Describes occurrence of gold and coal in the region.

171 —— The Sushitna drainage area [Alaska].

U. S. Geol. Surv., Expl. in Alaska, pp. 111-112, 1899.

Describes general physiographic and geologic features.

172 —— and **Muldrow** (Robert). Report of the Sushitna expedition [Alaska].

U. S. Geol. Surv., Expl. in Alaska, pp. 15-27, 1899.

Describes the physiography, the character and occurrence of the granite and sedimentary formations, and the geologic structure and mineral resources of the region.

173 **Elftman** (Arthur H.). Preliminary report of field work during the summer 1895.

Minn. Geol. and Nat. Hist. Surv., 24th Ann. Rept., pp. 148-149, 1899.

Brief notes on the occurrence of anorthosytes.

174 —— List of rock samples collected in northeastern Minnesota in 1895, 1896, and 1897 (prepared by U. S. Grant).

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181 —— Glacial Lakes Newberry, Warren, and Dana, in central New York.

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Can. Min. Inst., Jour., vol. ii, pp. 119–129; Can. Min. Rev., vol. xviii, p. 78, 1899.

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183 **Farrington** (Oliver C.). A fossil egg from South Dakota.

Field Col. Mus., Geol. ser., vol. i, No. 5, pp. 192–200, pls. xx–xxi, figs. 1–2, 1899.

184 **Finch** (J. W.). [Review of "Iowa Geological Survey, Ann. Rept. 1898, vol. ix."]

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185 **Fleming** (Mary A.). The potholes of Fosters Flats (now called Niagara Glen) on the Niagara River.

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187 —— **Shaler** (N. S.), **Woodworth** (J. B.), and. Geology of the Narragansett Basin.

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188 **Fontaine** (W. M.). Notes on Lower Cretaceous plants from the Hay Creek coal field, Crook County, Wyoming.
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189 —— See **Ward** (L. F.), No. 690.

190 **Foote** (H. W.), **Penfield** (S. L.) and. Chemical composition of tourmaline.
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191 **Foote** (Warren M.). Note on a new meteoric iron found near the Tombigbee River, in Choctaw and Sumter counties, Alabama.
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193 **Forsyth** (A.), **O'Harra** (C. C.) and. Notes on the geology and mineral deposits of a portion of the southern Black Hills.
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196 —— Notes on an unusual orientation of phenocrysts in a dike.
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197 —— The occurrence and uses of mica.
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198 —— [Review of "Mineralogical notes, analyses of tysonite, bastnasite, prosopite, jeffersonite, covellite," etc., by W. F. Hillebrand.]
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201 —— [Review of "Platinum and iridium in meteoric iron," by J. M. Davison.]
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202 —— [Review of "Causes of variation in composition of igneous rocks," by T. L. Walker.]
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203 —— [Review of "On the associated minerals of rhodolite," by W. E. Hidden and J. H. Pratt.]
Am. Geol., vol. xxiii, p. 328 (5 l.), 1899.

204 —— [Review of "The alkaline reaction of some natural silicates," by F. W. Clarke.]
Am. Geol., vol. xxiii, p. 328 (7 l.), 1899.

205 —— [Review of "Petroleum inclusions in quartz crystals," by Chas. L. Reese.]
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206 —— [Review of "Mineral resources of Cuba," by Raimundo Cabrera.]
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207 —— [Review of "The slate region of Pennsylvania," by Mansfield Merriam.]
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208 —— [Review of "On the phenocrysts of intrusive igneous rocks," by L. V. Pirsson; "On the occurrence, origin, and chemical composition of chromite," by J. H. Pratt; "Some rock-forming biotites and amphiboles," by H. W. Turner; "On the occurrence of Paleotrochis in volcanic rocks in Mexico," by H. S. Williams; "Origin of Paleotrochis," by J. S. Diller; "Goldschmidtite, a new mineral," by W. H. Hobbs; and "On a hydromica from New Jersey," by F. W. Clarke and N. H. Darton.]
Am. Geol., vol. xxiv, pp. 180–182, 1899.

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217 **Gilbert** (Grove Karl). Glacial sculpture in western New York.
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218 —— Dislocation at Thirtymile point, New York.
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Describes overturned fold in Medina formation and discusses origin of the structure.

219 —— Ripple marks and cross bedding.
Geol. Soc. Am., Bull., vol. x, pp. 135–140, pl. xiii, 5 figs., 1899. Abstracts: Am. Geol., vol. xxiii, p. 102 (⅓ p.); Science, new ser., vol. ix, p. 138 (½ p.), 1899.
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220 —— [Review of "The great ice dams of Lakes Maumee, Whittlesly, and Warren," by F. B. Taylor.]
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221 —— Recent earth movement in the Great Lakes region.
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222 **Girty** (George H.). Preliminary report on Paleozoic invertebrate fossils from the region of the McAlester coal field, Indian Territory.
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223 —— Devonian and Carboniferous fossils. [Yellowstone National Park.]
U. S. Geol. Surv., Mon. XXXII, Pt. II, pp. 479–599, pls. lxvi–lxxi, 1899.
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226 —— [Review of "Physical geography of New Jersey," by R. D. Salisbury.]
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229 **Grabau** (Amadeus W.). The paleontology of the Eighteen Mile Creek and the Lake Shore sections of Erie County, New York.
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230 —— The faunas of the Hamilton group of Eighteen-mile Creek and vicinity, in western New York.
N. Y. Geol. Surv., 16th Ann. Rept., pp. 227–340, 5 pls., 6 figs., 1899.
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231 —— Moniloporidæ, a new family of Paleozoic corals.
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232 —— Some modern stratigraphic problems.
Abstract: Science, vol. x, p. 85 (½ p.), 1899.

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234 **Grant** (U. S.). The geology of Cook County [Minnesota].
Minn. Geol. and Nat. Hist. Surv., Final Rept., vol. iv, pp. 313–345, pl. lxix, HH-KK, 1899.
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235 —— The geology of the Pokegama Lake plate [Minnesota].
Minn. Geol. and Nat. Hist. Surv., Final Rept., vol. iv, pp. 346–349, pl. lxx, 1899.
Describes character and occurrence of the Cambrian strata of the region.

236 —— The geology of the Grand Rapids plate [Minnesota].
Minn. Geol. and Nat. Hist. Surv., Final Rept., vol. iv, pp. 350–354, pl. lxxi, 1899.
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237 **Grant** (U. S.). The geology of the Swan Lake plate [Minnesota].
Minn. Geol. and Nat. Hist. Surv., Final Rept., vol. iv, pp. 355–357, pl. lxxii, 1899.
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238 —— The geology of the Gabbro Lake plate [Minnesota].
Minn. Geol. and Nat. Hist. Surv., Final Rept., vol. iv, pp. 399–419, pl. lxxxviii, and MM and PP, 1899.
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239 —— The geology of the Snowbank Lake plate [Minnesota].
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240 —— The geology of the Fraser Lake plate [Minnesota].
Minn. Geol. and Nat. Hist. Surv., Final Rept., vol. iv, pp. 434–461, pls. lxxx and LL, figs. 78–79, 1899.
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241 —— The geology of the Akeley Lake plate [Minnesota].
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242 —— The geology of the Gunflint Lake plate [Minnesota].
Minn. Geol. and Nat. Hist. Surv., Final Rept., vol. iv, pp. 481–490, pl. lxxxii, NN, figs. 88, 89, 1899.
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243 —— The geology of the Rove Lake plate [Minnesota].
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244 —— The geology of the Mountain Lake plate [Minnesota].
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246 —— List of rock samples collected in northeastern Minnesota in 1898.
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247 **Grant** (U. S.). The geology of Itasca County [Minnesota].
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248 —— [Review of "The educational series of rock specimens collected and distributed by the United States Geological Survey," by J. S. Diller.]
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249 —— [Review of "Recent earth movement in the Great Lakes region," by G. K. Gilbert.]
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250 —— [Review of "Geology of Lake Placid region," by J. F. Kemp.]
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251 —— [Review of "The hardystonite, a new calcium zinc silicate from Franklin Furnace, New Jersey," by J. E. Wolff.]
Am. Geol., vol. xxiii, p. 329 (¼ p.), 1899.

252 —— [Review of "Mineral resources of Kansas, 1898," by Erasmus Haworth; and "The Crystal Falls iron-bearing district of Michigan," by J. M. Clements and H. L. Smyth; with a chapter on the Sturgeon River tongue, by W. S. Bayley, and an introduction by C. R. Van Hise.]
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253 —— A possible driftless area in northeastern Minnesota.
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254 —— See **Elftman** (A. H.), No. 174.

255 —— **Winchell** (H. V.) and. Preliminary report on the Rainy Lake gold region [Minnesota].
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256 **Gratacap** (L. P.). Notes on the limonite beds on Ocean terrace [Staten Island, New York].
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257 —— The Comstock lode [Nevada].
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258 —— A plea for the popular exposition of lithology for museum purposes.
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262 —— Possible new coal plants in coal.

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263 **Grinnell** (George Bird). The glaciers in Montana.

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265 —— Classification of coastal forms.

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266 —— Note on monadnocks.

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267 —— Thames River in Connecticut.

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269 —— Descriptive geology of Huckleberry Mountain and Big Game Ridge [Yellowstone National Park].

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270 **Hague** (Arnold). Early Tertiary volcanoes of the Absaroka Range.
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271 —— [A geological relief map of the Yellowstone National Park and of the Absaroka Range.]
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274 —— and **Sardeson** (F. W.). Eolian deposits of eastern Minnesota.
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279 **Harris** (Gilbert D.). Natchitoches area [Louisiana].
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280 —— The Cretaceous and Lower Eocene faunas of Louisiana.
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286 **Hay** (O. P.) On some changes in the names, generic and specific, of certain fossil fishes.
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289 —— On the nomenclature of certain American fossil invertebrates.
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Annals and Mag. of Nat. Hist., 7th ser., vol. iii, pp. 480–487, 5 figs., 1899.

294 **Hayes** (C. Willard). Physiography of the Chattanooga district in Tennessee, Georgia, and Alabama.
U. S. Geol. Surv., 19th Ann. Rept., Pt. II, pp. 1-58, pls. iv, fig. 1, 1899.

295 —— A brief reconnaissance of the Tennessee phosphate fields.
U. S. Geol. Surv., 20th Ann. Rept., Pt. VI (cont.), pp. 633-638, 1899.
Describes the occurrence and character of the phosphate deposits.

296 —— Physiography and geology of region adjacent to the Nicaragua Canal route.
Geol. Soc. Am., Bull., vol. x, pp. 285-348, pls. xxx-xxxii, 1899. Abstracts: Am. Nat., vol. xxxiii, pp. 679-680; Science, new ser., vol. ix, pp. 105, 153-154; Am. Geol., vol. xxiii, pp. 94-96, 1899.
Describes physiographic features, climate, the geology of the region, the processes of rock decay, and the recent geologic history.

297 —— Physiography of the Nicaragua Canal route.
Nat. Geog. Mag., vol. x, pp. 233-246, map, 2 pls., 1 fig., 1899.
Describes the physiographic features of the region.

298 —— The Nicaragua Canal route.
Science, new ser., vol. x, pp. 97-104, 1 fig., 1899.
Contains an account of the general physiographic and geologic features of the region.

299 **Heilprin** (Angelo). Geology of the Klondike gold fields.
Pop. Sci. Mo., vol. lv, pp. 300-317, 5 figs., 1899.

300 **Hershey** (Oscar H.). Observations on dirtstorms.
Am. Geol., vol. xxiii, pp. 380-382, 1899.
Describes the occurrence and phenomena accompanying dirtstorms in the Mississippi Valley.

301 —— Origin and age of certain gold "pocket" deposits in northern California.
Am. Geol., vol. xxiv, pp. 38-43, 1899.
Describes the geologic features of the region, and the character, age, and origin of the gold deposits.

302 —— Age and origin of certain gold deposits on the Isthmus of Panama.
Am. Geol., vol. xxiv, pp. 73-77, 1899.
Describes the character, occurrence, and age of the gold-bearing formations.

303 —— Correlations in the Ozark region, a correction.
Am. Geol., vol. xxiv, pp. 190-192, 1899.
Discusses correlation of the Carboniferous and Devonian formations of the region.

304 —— The gold-bearing formations of Stephenson County, Illinois.
Am. Geol., vol. xxiv, pp. 240-244, 1899.
Describes occurrence of gold in the Utica formation of Illinois.

305 **Hershey** (Oscar H.). Archæological notes on central Minnesota.
Am. Geol., vol. xxiv, pp. 283–294, 1899.
Describes glacial phenomena of the region and the occurrence of the implement-bearing beds.

306 —— The Upper Coffee Creek mining district [California].
Min. and Sci. Press, vol. lxxix, p. 689, 1899.
Describes the geologic features and occurrence of gold in the region.

307 **Heydon** (A. Thurston). The headwaters of the Lewis River [British Columbia.]
Min. and Sci. Press, vol. lxxviii, p. 65, 1899.
Describes occurrence of gold in the region.

308 —— Glacial agency in lake formation.
Min. and Sci. Press, vol. lxxviii, p. 265, 1 fig., 1899.

309 **Hidden** (W. E.), **Judd** (J. W.) and. New mode of occurrence of ruby in North Carolina.
See Judd (J. W.) and Hidden (W. E.). No. 367.

310 **Hilgard** (E. W.). The subdivision of genera.
Science, new ser., vol. x, pp. 649–650, 1899.

311 **Hill** (Benj. F.). Notes on a set of rocks from Wyoming, collected by Prof. Wilbur C. Knight, of the University of Wyoming.
School of Mines Quart., vol. xx, pp. 357–364, 5 figs., 1899.
Describes the petrographic characters of the rocks collected.

312 **Hill** (Robert T.). Cuba and Porto Rico, with the other islands of the West Indies; their topography, climate, flora, products, industries, cities, people, political conditions, etc.
New York, The Century Company, 1898, pp. 28–429, 2 maps, 79 plates. Review: Science, new ser., vol. ix, pp. 65–66, 1899.
Includes an account of the physiography and general geologic features of the West Indian Islands.

313 —— The geology and physical geography of Jamaica; study of a type of Antillean development, based upon surveys made for Alexander Agassiz.
Harvard Coll., Mus. of Comp. Zool., Bull., vol. xxxiv, pp. 1–256, 41 pls., 40 figs. Review: Jour. of Geol., vol. vii, pp. 815–824, 1899.
Describes the topographic and geologic features, the occurrence, character, distribution, and fauna of the Cretaceous, Tertiary, and Pleistocene formations and discusses their relation to formations in adjacent islands and the history of the physiographic changes of the West Indies. Contains petrographic notes on igneous rocks by Whitman Cross.

314 —— Porto Rico.
Nat. Geog. Mag., vol. x, pp. 93–112, 13 figs., 1899.
Describes the general physiographic and geologic features of the island.

315 **Hillebrand** (W. F.). Chemical notes on the composition of the roofing slates of eastern New York and western Vermont.
U. S. Geol. Surv., 19th Ann. Rept., Pt. III, pp. 301–305, 1899.

316 —— Mineralogical notes, analyses of tysonite, bastnasite, prosopite, jeffersonite, covellite, etc.
Am. Jour. Sci., 4th ser., vol. vii, pp. 51–57, 1899. Abstract: Am. Geol., vol. xxiii, pp. 324–325 (½ p.), 1899.

317 —— Analysis and composition [of roscoelite].
Am. Jour. Sci., 4th ser., vol. vii, pp. 451–454, 1899. Review: Am. Geol., vol. xxiv, p. 317 (⅛ p.), 1899.

Describes methods of analysis and chemical composition of the material.

318 —— Mineralogical notes, melonite (?), coloradoite, petzite, hessite.
Am, Jour. Sci., 4th ser., vol. viii, pp. 295–298, 1899. Review: Am. Geol., vol. xxiv, p. 321 (8 l.), 1899.

319 **Hills** (Richard Charles). Elmoro folio, Colorado.
U. S. Geol. Surv., Geol. Atlas of U. S., folio No. 58, 1899.

Describes the physiography, the occurrence, and character of the Cretaceous, Neocene, and igneous rocks, and the occurrence of coal and other economic products. Includes topographic and geologic maps, structure, and columnar sections, and special illustrations.

320. **Hobbs** (Walter E.). Some new fossils from eastern Massachusetts.
Am. Geol., vol. xxiii, pp. 109–115, 1 fig., 1899.

Describes character and occurrence of Algonkian and Cambrian rocks, the occurrence of organic remains in the Algonkian strata and the character of a new species from the Middle Cambrian.

321. **Hobbs** (W. H.). The diamond field of the Great Lakes.
Jour. of Geol., vol. vii, pp. 375–388, 1899.

Gives historical sketch of the discovery of diamonds in this region and describes their character, occurrence, and origin.

322 —— Goldschmidtite, a new mineral.
Am. Jour. Sci., 4th ser. vol. vii, pp. 357–364, 1899. Review: Am. Geol., vol. xxiv, p. 182 (⅛ p.) 1899.

Describes the chemical and crystallographic characters of goldschmidtite and sylvanite.

323 —— Spiral fulgurite from Wisconsin.
Am. Jour. Sci., 4th ser., vol. viii, pp. 17–20, 1899.

Describes character and occurrence of the material.

324 **Hoffmann** (G. Christian). An occurrence of polycrase in Canada.
Am. Jour. Sci., 4th ser., vol. vii, p. 243 (½ p.), 1899.

Describes occurrence and chemical composition.

325 **Hollick** (Arthur). Some features of the Staten Island drift, New York.
Abstract: Geol. Soc. Am., Bull., vol. x, pp. 2–4, 1899.

Describes general geology and character of the glacial moraines.

326 **Hollick** (Arthur). The relation between forestry and geology in New Jersey.

Am. Nat., vol. xxxiii, pp. 1-14, 109-116, 1899.

327 —— Geology and geography of the American Association for the Advancement of Science.

Science, new ser., vol. x, pp. 487-491, 1899.

Contains brief abstracts of papers read.

328 —— A report on a collection of fossil plants from northwestern Louisiana.

La. Exp. Stat., Part V, pp. 276-288, pls. 32-48, 1899.

329 —— Notes on deep wells at Princes Bay and Huguenot [Staten Island, New York].

Staten Island Nat. Sci. Assoc., Proc., vol. vii, p. 19, 1899.

330 **Holmes** (Chas.). Coal and coal mining in Michigan.

Abstract: Eng. and Min. Jour., vol. lxviii, pp. 335-336, 1899.

Describes occurrence and character of the coal.

331 **Holmes** (J. A.). Mica deposits in the United States.

U. S. Geol. Surv., 20th Ann. Rept., Pt. VI (cont.), pp. 691-707, 1899.

Abstracts: The Mineral Industry for 1898, vol. vii, pp. 510-511; Science, new ser., vol. ix, p. 142 (½ p.); Am. Geol., vol. xxiii, pp. 106-108; Eng. and Min. Jour., vol. lxvii, p. 174, 1899.

Describes the occurrence, character, structure, and origin of mica deposits.

332 —— Some geologic conditions favoring water-power developments in the South Atlantic region.

Abstracts: Am. Assoc. Adv. Sci., Proc., vol. xlviii, p. 226 (½ p.); Science, new ser., vol. x, p. 488 (½ p.), 1899.

333 **Holmes** (W. H.), **McGee** (W J) and. The geology and archeology of California.

See McGee (W J) and Holmes (W. H.), No. 455.

334 **Hopkins** (T. C.). Clays and clay industries of Pennsylvania. I. Clays of western Pennsylvania (in part).

Pa. State Coll., Ann. Rept. for 1897, appendix, pp. 1-183, 6 pls., 57 figs., 1898.

Describes the general features of clay and their products manufactured in the State.

335 —— Feldspars and kaolins of southeastern Pennsylvania.

Franklin Inst., Jour., vol. cxlviii, pp. 1-31, 1899.

Describes character, occurrence, and distribution in the region.

336 —— Kaolin: Its occurrence, technology, and trade.

The Mineral Industry for 1898, vol. vii, pp. 148-160, 1899.

Describes occurrence and distribution in the United States.

337 —— Feldspar: The occurrence, mining, and uses.

The Mineral Industry for 1898, vol. vii, pp. 262-268, 1899.

Describes occurrence and distribution in the United States.

338 **Hopkins** (T. C.). [Review of "Geology of the Yellowstone National Park, Part II, Descriptive geology, petrography, and paleontology," by Arnold Hague, J. P. Iddings, W. H. Weed, C. D. Walcott, G. H. Girty, T. W. Stanton, and F. H. Knowlton.]

Jour. of Geol., vol. vii, pp. 709–713, 1899.

339 —— The Conshohocken plastic clays [Pennsylvania].

Abstracts: Am. Geol., vol. xxiii, p. 102 (7 l.); Science, new ser., vol. ix, p. 139 (7 l.), 1899.

340 **Hovey** (E. O.). Eleventh winter meeting of the Geological Society of America.

Am. Geol., vol. xxiii, pp. 86–109; Sci. Am. Suppl., vol. xlvii, pp. 19288–19290, 1899.

Gives a summary of the papers read.

341 —— See **Whitfield** (R. P.), No. 730.

342 **Hovey** (Horace C.). The life and work of James Hall, LL. D.

Am. Geol., vol. xxiii, pp. 137–168, pls. iv–v, 1899.

Gives a sketch of his life and work and a list of his publications.

343 **Hubbard** (Lucius L.). Keweenaw Point, with particular reference to the felsites and their associated rocks [Michigan].

Mich. Geol. Surv., vol. vi, Part II, 155 pp., 10 pls., 11 figs., 1898.

Describes the character, occurrence, and relations of the sedimentary and volcanic rocks of the region.

344 **Hunt** (Alfred E.). Corundum in Ontario.

Am. Inst. Min. Engrs., Trans., vol. xxviii, p. 875, 1899.

In discussion of paper by Archibald Blue on the same subject.

I.

345 **Iddings** (Joseph P.). The intrusive rocks of the Gallatin Mountains, Bunsen Peak, and Mount Everts [Yellowstone National Park].

U. S. Geol. Surv., Mon. XXXII, Pt. II., pp. 60–88, pls. xi–xii, 1899.

Describes the petrographic and chemical characters of the rocks.

346 —— The igneous rocks of Electric Peak and Sepulchre Mountain [Yellowstone National Park].

U. S. Geol. Surv. Mon. XXXII, Pt. II, pp. 89–148, pls. xiii–xxii, figs. 1–3, 1899.

Describes the geologic features of the region and the character of the intrusive and volcanic rocks.

347 —— The dissected volcano of Crandall Basin, Wyoming.

U. S. Geol. Surv., Mon. XXXII, Pt. II, pp. 215–268, pls. xxvii–xxxiv, 1899.

Describes the general geology of the region, the occurrence and character of the breccias, the intrusive rocks, and the granular core and dikes. Includes chemical analyses.

348 **Iddings** (Joseph P.). The igneous rocks of the Absaroka Range and Two Ocean Plateau and of outlying portions of the Yellowstone National Park.

U. S. Geol. Surv., Mon. XXXII, Pt. II, pp. 269–325, pl. xxxv, 1899.

Describes the petrographic characters of the breccias, flows, and dike rocks.

349 —— Absarokite-shoshonite-banakite series [Yellowstone National Park].

U. S. Geol. Surv., Mon. XXXII, Pt. II, pp. 326–355, pls. xxxvi–xxxviii, 1899.

Describes petrographic and chemical characters.

350 —— The rhyolites [Yellowstone National Park].

U. S. Geol. Surv., Mon. XXXII, Pt. II, pp. 356–432, pls. xxxix–lvii, fig. 4, 1899.

Describes the megascopical and microscopical characters of the rhyolites and their distribution in the park.

351 —— Recent basalts [Yellowstone National Park].

U. S. Geol. Surv., Mon. XXXII, Pt. II, pp. 433–440, pls. lvii–lix, 1899.

Describes their distribution and petrographic characters.

352 —— [Remarks on the use of the term plutonic plugs.]

Jour. of Geol., vol. vii, pp. 96–97 (½ p.), 1899.

353 —— [Review of "Geological report on Isle Royale, Michigan," by A. C. Lane.]

Jour. of Geol., vol. vii, pp. 718–720, 1899.

354 —— and **Weed** (W. H.). Descriptive geology of the Gallatin Mountains [Yellowstone National Park.]

U. S. Geol. Surv., Mon. XXXII, Pt. II, pp. 1–59, pls. i–x, 1899.

Describes the character and occurrence of the Cambrian, Silurian, Devonian, Carboniferous, Juratrias, and Cretaceous strata and igneous rocks of the region.

355 —— —— Descriptive geology of the northern end of the Teton Range [Yellowstone National Park].

U. S. Geol. Surv., Mon. XXXII, Pt. II, pp. 149–164, pl. xxiii, 1899.

Describes the structure and the character and occurrence of the Cambrian, Silurian, Devonian, Carboniferous, Juratrias, and Cretaceous rocks of the region.

356 **Ingall** (Elfric Drew). Section of mineral statistics and mines. Annual report for 1897.

Can. Geol. Surv., new series, vol. x, Rept. S, 232 pp., 1898.

357 **Irving** (John D.). Some contact phenomena of the Palisade diabase [New Jersey].

School of Mines Quart., vol. xx, pp. 213–223, 3 figs., 1899.

Describes the effects of the intrusive on the diabase and sedimentary rocks.

J.

358 **Jaggar** (T. A., jr.). [Review of "Maryland Geological Survey, vols. i and ii."]
Am. Nat., vol. xxxiii, pp. 277–279, 1899.

359 **Jefferson** (M. S. W.) Beach cusps.
Jour. of Geol., vol. vii, pp. 237–246, 5 figs., 1899.
Describes mode of formation on Massachusetts coast.

360 **Jenney** (W. P.). See **Ward** (L. F.), No. 690.

361 **Johnson** (Charles W.). A new Pliocene Polygyra from Florida.
Nautilus, vol. xiii, pp. 679–681, 1899.
Describes Polygyra caloosaensis n. sp.

362 **Johnson** (W. D.). An unrecognized process in glacial erosion.
Abstracts: Am. Geol., vol. xxiii, pp. 99–100; Science, vol. ix, p. 106 (½ p.), 1899.

363 —— The work of glaciers in high mountains.
Abstract: Science, new ser., vol. ix, pp. 112–113, 1899.

364 —— Subsidence basins of the high plains.
Abstract: Science, new ser., vol. ix, pp. 152–153, 1899.

365 **Jones** (A. W.). New developments of the Mentor beds.
Kan. Acad. Sci., Trans., vol. xvi, pp. 65–66, 1899.
Gives notes on occurrence and fauna in Kansas.

366 **Jones** (T. Rupert) and **Woodward** (Henry). Contributions to fossil Crustacea.
Geol. Mag., dec. iv, vol. vi, pp. 388–395, pl. xv, 1899.
Describes Bellinurus grandævus from Nova Scotia.

367 **Judd** (J. W.) and **Hidden** (W. E.). New mode of occurrence of ruby in North Carolina. With crystallographic notes by J. H. Pratt.
Am. Jour. Sci., 4th ser., vol. viii, pp. 370–381, 1899.
Describes occurrence, character, mineral associates, and crystallography of the material.

367*a* **Jukes-Browne** (A. J.), **Harrison** (J. B.) and. The Oceanic deposits of Trinidad [British West Indies].
See Harrison (J. B.) and Jukes-Browne (A. J.), No. 284.

K.

368 **Kain** (S. W.), **Matthew** (G. F.) and. On artesian and fissure wells in New Brunswick.
See Matthew (G. F.) and Kain (S. W.), No. 473.

369 **Kelvin** (Lord). The age of the earth as an abode fitted for life.
Science, new ser., vol. ix, pp. 665–674 and 704–711, 1899.

370 **Kemp** (James Furman). The titaniferous iron ores of the Adirondacks.

U. S. Geol. Surv., 19th Ann. Rept., Pt. III, pp. 377–422, pls. lv–lxiii, 1899.

Describes the chemical composition, geologic features, local occurrence, and origin of the titaniferous ores of the region. Reviews the general occurrence of these ores in other regions.

371 —— Granites of southern Rhode Island and Connecticut with observations on Atlantic coast granites in general.

Geol. Soc. Am. Bull., vol. x, pp. 361–382, pls. xxxv–xli, 1899. Abstracts: Am. Geol., vol. xxiii, pp. 105–106 (½ p.); Science, new ser., vol. ix, pp. 140–141, 1899.

Describes petrographic character of the Rhode Island granites and the occurrence and character of the granites in the States and Provinces of the Atlantic coast.

372 —— A brief review of the titaniferous magnetites.

School of Mines Quart., vol. xx, pp. 323–356, vol. xxi, pp. 56–65, 1899.

Describes occurrence and chemical characters of the magnetite ores of the United States and other countries.

373 —— Metamorphosed basic dikes in the Manhattan schists, New York City.

Abstracts: Am. Geol., vol. xxiii, p. 105 (6 l.); Science, new ser., vol. ix, p. 140 (½ p.), 1899.

374 —— Eleventh Annual Meeting of the Geological Society of America. December 28, 29, and 30 [1898], New York.

Science, new ser., vol. ix, pp. 100–106, 138–145, 1899.

Contains abstracts of papers presented at the meeting.

375 **Kendall** (J. D.). The silver-lead deposits of the Slocan, British Columbia.

Can. Min. Rev., vol. xviii, pp. 172–186, 42 figs., 1899.

Describes the occurrence and character of the deposits.

376 **Keyes** (Charles R.). American homotaxial equivalents of the original Permian.

Jour. of Geol., vol. vii, pp. 321–341, 1899.

Describes character, occurrence, and faunas of probable Permian strata and discusses their homotaxial relations to the Permian of Europe.

377 —— Some physical aspects of general geological correlation.

Iowa Acad. Sci., Proc., vol. vi, pp. 131–154, pl. vi, 1899.

Discusses methods and criteria to be employed in geologic correlation.

378 —— The Missourian series of the Carboniferous.

Am. Geol., vol. xxiii, pp. 298–316, 1899.

Gives a historical review of the literature on this series, and a description of the character, distribution, and geologic structure of the subdivisions of the series.

379 —— [Review of a review of Wachsmuth and Springer's Monograph on Crinoids, by F. A. Bather.]

Am. Geol., vol. xxiv, pp. 56–58, 1899.

380 **Keyes** (Charles R.). On stratification planes.
Am. Geol., vol. xxiv, pp. 294–300, 1899.
Describes bedding planes, terranal planes, great planes of sedimentation, and erosion planes.

381 —— [Review of "Geology of the Aspen mining district, Colorado," by J. Edward Spurr.]
Am. Geol., vol. xxiv, pp. 307–308, 1899.

382 **Kimball** (James P.). The granites of Carbon County, Montana: A division and glacier field of the Snowy Range.
Am. Geog. Soc. Bull., vol. xxxi, pp. 109–215, pls. i–v, fig. 1, 1899.
Describes the physiographic features of the region and the occurrence of glaciers.

383 **Kindle** (Edward M.). The Devonian and Lower Carboniferous faunas of southern Indiana and central Kentucky.
Am. Pal. Bull., No. 12, 112 pp., 1899.
Describes briefly the stratigraphy of the region and gives notes on the fauna of various sections and a list showing range and distribution of the species. Discusses correlation of the faunas.

384 **King** (Francis H.). Principles and conditions of the movements of ground water.
U. S. Geol. Surv. 19th Ann. Rept., Pt. II, pp. 59–294, pls. vi–xvi, figs. 2–53, 1899.

385 **King** (Helen Dean). Edward Drinker Cope.
Am. Geol., vol. xxiii, pp. 1–41, pl. i, 1899.
Gives a brief sketch of Professor Cope's life and bibliographic list of his publications.

386 **Knapp** (S. A.). Occurrence and recovery of sodium carbonate in the Great Basin.
The Mineral Industry for 1898, vol. vii, pp. 626–634, 1899.

387 **Knight** (Wilbur C.). The Nebraska Permian.
Jour. of Geol., vol. vii, pp. 357–374, 1899.
Describes character, occurrence, and faunas of the Kansas and Nebraska Permian strata.

388 —— Some new data for converting geological time into years.
Science, new ser., vol. x, pp. 607–608, 1899.
Describes the method adopted of estimating the time of the erosion of certain Miocene beds in Wyoming.

389 —— and **Barbour** (E. H.). The discovery of new invertebrates in the Dinosaur beds of Wyoming.
See Barbour (E. H.) and Knight (W. C.), No. 31.

390 —— and **Slosson** (E. E.). The oil fields of Crook and Uinta counties, Wyoming.
Wyoming Univ. School of Mines, Bull., No. 3, 1899. (Not seen.)

391 **Knowlton** (Frank Hall). Report on some fossil wood from the Richmond Basin, Virginia.

U. S. Geol. Surv., 19th Ann. Rept., Pt. II, pp. 516–519, pl. lii, 1899.

Describes two species of Araucarioxylon.

392 —— Fossil flora [Yellowstone National Park].

U. S. Geol. Surv., Mon. XXXII, Pt. II, pp. 651–882, pls. lxxvii–cxxi, 1899.

Describes the fossil flora collected in the region and their relations, and the occurrence and character of the fossil forests.

393 —— Catalogue of Cretaceous and Tertiary plants of North America.

Review: Am. Jour. Sci., 4th ser., vol. vii, p. 168 (½ p.), 1899.

See Bibliography and Index for 1898, No. 450.

394 —— See **Ward** (L. F.). No. 690.

395 **Kümmel** (Henry B.). The extension of the Newark system of rocks.

N. J. Geol. Surv., Rept. for 1898, pp. 43–57, pl. ii, figs. 9–10, 1899. Abstracts: Am. Geol., vol. xxiii, p. 83 (½ p.); Science, new ser., vol. ix, pp. 102–103, 1899.

Describes the extension of the Newark system into New York.

396 —— The Newark rocks of New Jersey and New York.

Jour. of Geol., vol. vii, pp. 23–52, 4 figs., 1899.

Describes the occurrence, character, structure, and relation of the Newark sedimentary and trap rocks of the region. Includes geologic maps.

397 **Kuntze** (Otto). On the occurrence of quenstedtite near Montpelier, Iowa.

Am. Geol., vol. xxiii, pp. 119–121, 1899.

Describes occurrence, mode of formation, and chemical character.

398 **Kunz** (George F.). Native silver in North Carolina.

Am. Jour. Sci., 4th ser., vol. vii, pp. 242–243, 1899.

L.

399 **Ladd** (George E.). A preliminary report on a part of the clays of Georgia.

Ga. Geol. Surv. Bull., No. 6A, 204 pp., 28 pls., 1898.

Describes properties, occurrence, and distribution of clay deposits in Georgia.

400 —— Notes on the Cretaceous and associated clays of middle Georgia.

Am. Geol., vol. xxiii, pp. 240–249, 1899.

Describes the relations of the Cretaceous and Tertiary strata and character of the clays of the Potomac formation.

401 **Lakes** (Arthur). The Mother Lode of California.
Mines and Minerals, vol. xix, pp. 248–250, 5 figs., 1899.
Describes the structure and occurrence of the veins.

402 —— Boulder region, Colorado.
Mines and Minerals, vol. xix, pp. 252–253, 1899.
General notes on the region.

403 —— Placer mining in California.
Mines and Minerals, vol. xix, pp. 297–298, 2 figs., 1899.

404 —— Natural gas in Colorado.
Mines and Minerals, vol. xix, pp. 339–340, 1899.
Describes occurrence and origin.

405 —— New Almaden mines of Santa Clara County, California.
Mines and Minerals, vol. xix, pp. 346–349, 3 figs., 1899.

406 —— Observations on some prospects and mines around Breckenridge, South Park, Colorado.
Mines and Minerals, vol. xix, pp. 440–441, 2 figs., 1899.
Contains notes on the geology of the region.

407 —— California gold mines.
Mines and Minerals, vol. xix, pp. 444–446, 6 figs., 1899.

408 —— Coal fields of Colorado.
Mines and Minerals, vol. xix, pp. 541–543, 4 figs., 1899.

409 —— California asphaltum.
Mines and Minerals, vol. xx, pp. 108–109, 4 figs., 1899.
Describes occurrence and character of the material.

410 —— Grand River coal field of Colorado.
Mines and Minerals, vol. xx, pp. 110–111, 3 figs., 1899.
Describes geological occurrence of coal in this region.

411 —— Description of Raven Hill, Cripple Creek, and its ore deposits [Colorado].
Mines and Minerals, vol. xx, pp. 154–155, 1 fig., 1899.

412 —— Calaveras County mines [California].
Mines and Minerals, vol. xx, pp. 198–200, 6 figs., 1899.

413 **Lambe** (Lawrence M.). A revision of the genera and species of Canadian Paleozoic corals. The Madreporaria perforata and Alcyonaria.
Can. Geol. Surv., Cont. to Can. Pal., vol. iv, Pt. I, 96 pp., 5 pls., 1899.

414 —— On some species of Canadian Paleozoic corals.
Ottawa Nat., vol. xii, pp. 217–226, 237–258, 1899.
Describes structural details not given in original descriptions, and a supposed new species.

415 **Lambe** (Lawrence M.). On reptilian remains from the Cretaceous of northwestern Canada.
Ottawa Nat., vol. xiii, pp. 68–70, 1899.
Contains brief notes on the fossils collected.

416 —— Notes on a stromatoporoid from the Hudson River formation of Ontario.
Ottawa Nat., vol. xiii, pp. 170–171, 1399.
Contains notes on Labechia huronensis Billings.

417 **Lane** (Alfred C.). Geological report on Isle Royale, Michigan.
Mich. Geol. Surv., vol. vi, Pt. I, 281 pp., 16 pls., 29 figs., 1898.
Describes the structure, occurrence and character of the sedimentary and igneous rocks and the occurrence of diabase intrusives in the Huronian.

418 —— Water resources of the Lower Peninsula of Michigan.
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419 —— Lower Michigan mineral waters.
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420 —— Note on a method of stream capture.
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423 **Le Conte** (Joseph). The Ozarkian and its significance in theoretical geology.
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424 —— The Ozarkian and its significance in theoretic geology.
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429 **Leith** (C. K.). Summaries of current pre-Cambrian literature.
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431 **Leverett** (Frank). The Illinois Glacial lobe.
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432 —— Wells of northern Indiana.
U. S. Geol. Surv., Water-Supply Paper No. 21, 82 pp., 2 pls., 1899.
Abstract: Am. Geol., vol. xxiii, p. 385 (½ p.), 1899.
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433 —— Wells of southern Indiana.
U. S. Geol. Surv., Water-Supply Paper No. 26, 64 pp., 1899.
Gives data regarding the wells of the region.

434 —— The lower rapids of the Mississippi River.
Jour. of Geol., vol. vii, pp. 1–22, 2 figs., 1899; Iowa Acad. Sci. Proc., vol. vi, pp. 74–93, 1 fig., 1899.
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446 —— The characters of Bison occidentalis, the fossil bison of Kansas and Alaska.
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447 **Ludloff** (K.). The discovery of gold-bearing conglomerate in British Columbia.
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D. Van Nostrand Company, N. Y., 1898. Review: Am. Geol., vol. xxiv, pp. 120–121, 1899.

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451 **McCallie** (S. W.). A preliminary report on the artesian well system of Georgia.

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459 —— Snake River gold fields of Idaho.

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462 —— The evolution of climates (concluded).

Am. Geol., vol. xxiv, pp. 157–180, pp. 205–209, pl. xi, 1899.

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464 —— Note on a Bridger Eocene carnivore. (Note prepared by J. L. Wortman.)

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465 —— The origin of mammals.

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469 —— A Paleozoic terrane beneath the Cambrian.

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470 —— A new Cambrian trilobite.

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471 —— [Review of "Fossil Medusæ," by Charles D. Walcott].

Am. Geol., vol. xxiii, pp. 59–61, 1899.

472 —— [Review of preliminary notice of the Etcheminian fauna of Newfoundland.]

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N. B. Nat. Hist. Soc., Bull. No. 17, pp. 143–152, 1899.

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475 **Mendenhall** (W. C.). Report on the region between Resurrection Bay and the Tanana River [Alaska].

U. S. Geol. Surv. Expl. in Alaska, pp. 40–50, 1899.

Describes the physiography, the route of travel, the occurrence of Cretaceous and pre-Cretaceous sedimentaries, and the occurrence of gold and coal.

476 —— The Kenai Peninsula [Alaska].

U. S. Geol. Surv. Expl. in Alaska, pp. 109–110, 1899.

Brief summary of occurrence of gold and coal.

477 —— The Kadiak Islands. The Alaska Peninsula and the Aleutian Islands [Alaska].

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Describes physiographic features and occurrence of gold and coal.

478 —— **Schrader** (F. C.) and. [Notes on the geology of portions of Alaska].

See Schrader (F. C.) and Mendenhall (W. C.). No. 572.

479 **Mercer** (Henry C.). The bone cave at Port Kennedy, Pennsylvania, and its partial excavation in 1894, 1895, and 1896.

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Cal. Acad. Sci., Proc., 3rd ser., Geol., vol. i, No. 6, pp. 175–179, pl. xxiii, 1899.

482 **Merrill** (George P.). A discussion of the use of the terms rockweathering serpentinization and hydrometamorphism.

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483 **Merrill** (George P.). Preliminary note on new meteorites from Allegan, Michigan, and Mart, Texas.
Science, new ser., vol. x, pp. 770–771, 1899.
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484 —— A consideration of some little known American ornamental stones.
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485 **Merriman** (Mansfield). The slate regions of Pennsylvania.
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Can. Inst., Proc., new ser., vol. ii, pp. 23–26, 1899.
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488 —— Notes on the corundum-bearing rocks of eastern Ontario, Canada.
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489 **Minor** (Philip). A theory of genesis of ore deposits.
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490 **Monroe** (Charles E.) and **Teller** (Edgar E.). The fauna of the Devonian formation at Milwaukee, Wisconsin.
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491 **Moses** (Alfred J.). The characters of crystals: an introduction to physical crystallography.
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492 **Mosnat** (H. R.). Artesian wells of the Belle Plaine area [Iowa].
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493 **Mudge** (E. H.). Mouth of Grand River [Michigan].
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494 **Muldrow** (Robert), **Eldridge** (G. H.) and. Report on the Sushitna expedition [Alaska.]
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495 **Myers** (P. C.). Report on a fossil diatomaceous deposit in Muscatine County, Iowa.
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Gives a list of fossils found.

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496 **Nevins** (J. Nelson). Fibrous talc in St. Lawrence County, New York.

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497 **Newsom** (J. F.). The effect of sea barriers upon ultimate drainage.

Jour. of Geol., vol. vii, pp. 445–451, 5 figs., 1899.

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Can. Rec. Sci., vol. vii, pp. 477–478, figs. 1–3, 1898.

Describes crystallographic character.

499 **Nordenskjöld** (Otto). Die geologischen Verhältnisse der Goldlagerstätten des Klondikegebietes.

Zeit. für prak. Geol., 1899, Heft III, pp. 71–83 and map, 1899.

500 —— Preliminary notes on the surface geology of the Yukon Territory [Alaska].

Am. Geol., vol. xxiii, pp. 288–298, 1899.

Describes the character and origin of the physical features of the region.

501 **Norton** (W. H.). Geology of Scott County [Iowa].

Iowa Geol. Surv., vol. ix, pp. 393–519, pls. viii–xi, figs. 41–52, and geologic map, 1899.

Describes the physiography and drainage, the character and occurrence of the Silurian, Devonian, Carboniferous, and Pleistocene deposits, and the occurrence of coal, building stone, clay, and other economic products.

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502 **O'Harra** (C. C.) and **Forsyth** (A.). Notes on the geology and mineral deposits of a portion of the southern Black Hills, S. Dak.

S. Dak. School of Mines, Bull., 41 pp., 11 figs., 1899.

Describes the general geology and character and occurrence of the metamorphic rocks.

503 **Ordoñez** (Ezequiel) and **Rangel** (Manuel). El Real del Monte [Mexico].

Mexico Inst. Geol., Bull. No. 12, 165 pp., 21 pls., 9 figs., 1899.

Describes the physiography, the mineral resources, and the general geology of the region.

504 **Orton** (Edward). The rock waters of Ohio.

U. S. Geol. Surv., 19th Ann. Rept., Pt. IV, pp. 637–717, pls. lxxi–lxxiii, 1899.

Describes the lithologic characters of the geologic subdivisions of Ohio and the occurrence and character of the underground waters.

505 **Orton** (Edward). Geological structure of the Iola gas field [Kansas].

Geol. Soc. Am., Bull., vol. x, pp. 99–106, pl. ii, 1899. Abstracts: Am. Geol., vol. xxiii, pp. 101–102; Science, new ser., vol. ix, pp. 138–139, 1899.

Describes general geology of the region and the occurrence and character of the gas-bearing rocks.

506 —— Petroleum and natural gas in New York.

N. Y. State Mus., Bull., vol. vi, No. 30, pp. 399–526, 1899. (Not seen.)

507 —— The geology of Columbus and vicinity [Ohio].

Abstract: Science, new ser., vol. x, p. 487 (11 l.), 1899.

508 **Osborn** (Henry Fairfield). A complete mosasaur skeleton, osseous and cartilaginous.

Am. Mus. Nat. Hist., Mem., vol. i, pp. 167–188, pls. xxi–xxiii, 15 figs., 1899. Abstract: Science, new ser., vol. x, pp. 919–925, 3 figs., 1899.

509 —— A skeleton of Diplodocus.

Am. Mus. Nat. Hist., Mem., vol. i, pp. 191–214, pls. xxiv–xxviii, figs. 1–14, 1899. Abstract: Science, new ser., vol. x, pp. 870–874, fig. 1, 1899.

510 —— Origin of mammals.

Am. Jour. Sci., 4th ser., vol. vii, pp. 92–96, 1899.

511 —— Frontal horn on Aceratherium incisivum.

Science, new ser., vol. ix, pp. 161–162, pl. i, 1899.

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512 **Palache** (Charles). The crystallization of the calcite from the copper mines of Lake Superior.

Mich. Geol. Surv., vol. vi, Pt. II, appendix, pp. 161–184, 6 pls., 1898.

513 —— Powellite crystals from Michigan.

Am. Jour. Sci., 4th ser., vol. vii, pp. 367–369, 1899.

Describes crystallographic characters of the material.

514 —— Epidote and garnet from Idaho.

Am. Jour. Sci., 4th ser., vol. viii, pp. 299–302, 1899.

Describes occurrence and crystallographic characters of the material.

515 **Parks** (William Arthur). The Nipissing-Algoma boundary [Ontario].

Ont. Bur. of Mines, vol. viii, pp. 175–196, pls. xiii–xx, 1899.

Describes the physiography and drainage of the region and occurrence of Devonian rocks.

516 **Parmenter** (C. S.). Fossil turtle cast from the Dakota epoch.

Kans. Acad. Sci., Trans., vol. xvi, p. 67, pl. iv, 1899.

517 **Patton** (Horace B.). Tourmaline and tourmaline schists from Belcher Hill, Colorado.

Geol. Soc. Am., Bull., vol. x, pp. 21–26, pls. i–ii, 1899.

Describes occurrence of tourmaline as vein mineral and impregnating schists and discusses origin.

518 **Pearson** (H. W.). Is the so-called "Upheaval of Scandanavia" apparent or real?

Am. Geol., vol. xxiv, pp. 192–196, 1899.

Discusses the variation of coast lines as effected by tide and currents to explain the phenomena ascribed to continental upheaval.

519 **Peckham** (S. F.). Genesis of bitumen as related to chemical geology.

Abstract: Am. Geol., vol. xxiii, p. 327, (4 l.) 1899.

520 **Penfield** (S. L.) and **Foote** (H. W.). Chemical composition of tourmaline.

Am. Jour. Sci., 4th ser., vol. vii, pp. 97–125, 1899. Abstract: Am. Geol., vol. xxiii, p. 325 (½ p.), 1899.

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521 —— and **Warren** (C. H.). Chemical composition of parasite and a new occurrence of it in Ravalli Co., Montana.

Am. Jour. Sci., 4th ser., vol. viii, pp. 21–24, 1 fig., 1899. Review: Am. Geol., vol. xxiv, p. 318 (¼ p.), 1899.

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522 —— —— Some new minerals from the zinc mines at Franklin, N. J., and note concerning the chemical composition of ganomalite.

Am. Jour. Sci., 4th ser., vol. viii, pp. 339–353, 1899.

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523 **Perrine** (Charles D.). Earthquakes in California in 1898.

U. S. Geol. Surv., Bull. No. 161, 31 pp., 1899.

524 **Peters** (W. J.) and **Brooks** (Alfred H.). Report on the White River-Tanana expedition [Alaska].

U. S. Geol. Surv., Expl. in Alaska, pp. 64–75, 1899.

Describes physiography, the occurrence of metamorphic and sedimentary rocks, and occurrence of gold and copper.

525 **Phillips** (Alexander Hamilton). Mineralogical structure and chemical composition of the trap of Rocky Hill, N. J.

Am. Jour. Sci., 4th ser., vol. viii, pp. 267–285, 1899. Review: Am. Geol., vol. xxiv, p. 321 (8 l.), 1899.

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526 **Pirsson** (L. V.). [Review of "The educational series of rock specimens collected and distributed by the U. S. Geological Survey," by J. S. Diller.]

Am. Jour. Sci., 4th ser., vol. vii, p. 74 (½ p.), 1899.

527 **Pirsson** (L. V.). Phenocrysts of intrusive igneous rocks.

Am. Jour. Sci., 4th ser., vol. vii, pp. 271–280, 1899. Reviews: Am. Geol., vol. xxiii, p. 106 (½ p.), vol. xxiv, pp. 180–181 (½ p.); Science, new ser., vol. ix, p. 142 (¾ p.), 1899.

Describes the occurrence of phenocrysts and the evidences indicating that they have been formed in place.

528 —— [Reviews of "Pre-Cambrian igneous rocks of Fox River Valley, Wisconsin," by S. Weidman; and "West Virginia Geological Survey, vol. i."]

Am. Jour. Sci., 4th ser., vol. vii, pp. 398–399, 1899.

529 —— [Review of "Geological Survey of Michigan, vol. vi, 1893–1897," and "Report on gypsum and gypsum cement plasters," by G. P. Grimsley and E. H. S. Bailey.]

Am. Jour. Sci., 4th ser., vol. viii, pp. 466–467, 1899.

530 **Post** (W. S.), **Spurr** (J. E.) and. Report on the Kuskokwim expedition [Alaska].

See Spurr (J. E.) and Post (W. S.), No. 601.

531 **Pratt** (J. H.). Occurrence, origin, and chemical composition of chromite.

Am. Jour. Sci., 4th ser., vol. vii, pp. 281–286, 1899. Review: Am. Geol., vol. xxiv, p. 181 (⅓ p.), 1899.

Includes description of the Webster chromite for which the name mitchellite is proposed.

532 —— Separation of alumina from molten magmas, and the formation of corundum.

Am. Jour. Sci., 4th ser., vol. viii, pp. 227–231, 1899. Review: Am. Geol., vol. xxiv, pp. 319–321 (½ p.), 1899.

Gives results of field observations and laboratory experiments.

533 —— Notes on North Carolina minerals.

Abstract: Am. Geol., vol. xxiii, pp. 325–326 (½ p.), 1899.

534 —— See **Judd** (J. W.) and **Hidden** (W. E.), No. 367.

535 **Prosser** (Charles S.). Correlation of Carboniferous rocks of Nebraska with those of Kansas.

Jour. of Geol., vol. vii, pp. 342–356, 1899.

Describes character, occurrence, and relations of the Carboniferous rocks of the region.

536 —— Note on the distribution of the Cheyenne sandstone.

Kan. Univ. Quart., vol. viii, pp. 135–136, 1899.

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537 **Purdue** (A. H.). [Review of "The Department of geology and natural resources of Indiana, Twenty-third Annual Report."]

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538 **Purington** (Chester Wells). Economic geology [of Telluride quadrangle, Colorado].
U. S. Geol. Surv., Geol. Atlas of U. S., folio No. 57, 1899.
Describes the fissures and veins of the region, and the occurrence, character, and origin of the gold and silver ores.

R.

539 **Rangel** (Manuel), **Ordoñez** (Ezequiel) and. El Real del Monte.
See Ordoñez (E.) and Rangel (M.), No. 503.

540 **Ransome** (F. L.). New occurrence of nepheline syenite in New Jersey.
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541 —— **Turner** (H. W.) and. Big Trees folio, California.
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542 **Reed** (F. R. Cowper). A new trilobite from Mount Stephen, Field, B. C.
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Describes Oryctocephalus reynoldsi n. sp.

543 **Reese** (C. L.). Petroleum inclusions in quartz crystals.
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544 **Reid** (Harry Fielding). Stratification of glaciers.
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545 —— The variations of glaciers, IV.
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546 **Ries** (Heinrich). A report on Louisiana clay samples.
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547 —— The ultimate and rational analysis of clays and their relative advantages.
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550 **Riggs** (E. S.). The Milaguludæ; an extinct family of sciuromorph rodents.
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551 **Rogers** (Austin F.). Cupro-goslarite, a new variety of zinc sulphate.
Kan. Univ. Quart., vol. viii, pp. 105–106, 1899.
Describes occurrence and chemical character.

552 —— Normal ankerite from Phelps County, Missouri.
Kan. Univ. Quart., vol. viii, p. 183, 1899.
Describes occurrence and chemical character.

553 —— **Beede** (J. W.) and. New and little known pelecypods from the Coal Measures.
See Beede (J. W.) and Rogers (A. F.), No. 46.

554 **Ropes** (Leverett S.). Corundum mining in North Carolina and Georgia.
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555 **Roy** (Andrew). Jackson County, Ohio.
Mines and Minerals, vol. xix, pp. 254–255, 1899.
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556 **Russell** (Israel C.). [Remarks on the use of the term plutonic plugs.]
Jour. of Geol., vol. vii, pp. 96–97, 1899.

557 —— [Review of "The physiography and geology of the Nicaraguan Canal route," by C. Willard Hayes.]
Am. Nat., vol. xxxiii, pp. 679–688, 1899.

558 —— Geology of Cascade Mountains in Washington.
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Am. Jour. Sci., 4th ser., vol. vii, pp. 429–432, 1899.
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561 —— [Review of "Rivers of North America; a reading lesson for students of geography and geology," by I. C. Russell; and "Earth sculpture or the origin of land forms," by J. Geikie; and "Physical Geography," by W. M. Davis.]
Jour. of Geol., vol. vii, pp. 511–516, 1899.

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Jour. of Geol., vol. vii, pp. 815–824, 1899.

563 —— [Review of "Shoreline topography," by F. P. Gulliver.]
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564 —— and **Alden** (W. C.). The geography of Chicago and its environs.
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566 —— What is the loess?
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Describes occurrence and origin of the loess.

567 —— Lichenaria typa W. and S.
Am. Jour. Sci., 4th ser., vol. viii, pp. 101–105, 1899.
Reviews the literature on this species and describes its character.

568 —— **Hall** (C. W.) and. Eolian deposits of eastern Minnesota.
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569 **Schmitz** (E. J.). Notes on a reconnaissance from Springfield, Mo., into Arkansas.
Am. Inst. Min. Engrs. Trans., vol. xxviii, pp. 264–270, 1899.
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570 **Schrader** (F. C.). Report on Prince William Sound and the Copper River region [Alaska].
U. S. Geol. Surv., Expl. in Alaska, pp. 51–63, 1899.
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571 —— The Prince William Sound and Copper River country [Alaska].
U. S. Geol. Surv., Expl. in Alaska, pp. 105–108, 1899.
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572 —— and **Mendenhall** (W. C.). [Notes on geology of portions of Alaska.]
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573 **Schuchert** (Charles). The fossil field's expedition to Wyoming.
Science, new ser., vol. x, pp. 725–728, 1899.
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574 **Schuchert** (Charles), **Clarke** (John M.) and. The nomenclature of the New York series of geological formations.

See Clarke (J. M.) and Schuchert (C.), No. 101.

575 —— **Safford** (J. M.) and. Camden chert of Tennessee and its Lower Oriskany fauna.

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576 **Scott** (W. B.). The Selenodont Artiodactyls of the Uinta Eocene.

Wagner Free Inst. of Sci., Trans., vol. vi, xiii and 121 pp., 4 pls., 1899.

Describes the general features of the Uinta Basin and the characters of the material collected, and gives a summary, phylogenetic table, and references to literature.

577 **Shaler** (N. S.). Loess deposits of Montana.

Geol. Soc. Am., Bull., vol. x, pp. 245–252, 1899.

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578 —— Formation of dikes and veins.

Geol. Soc. Am., Bull., vol. x, pp. 253–262, 1899.

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579 —— Spacing of rivers with reference to hypothesis of baseleveling.

Geol. Soc. Am., Bull., vol. x, pp. 263–276, 1899.

Describes erosion of small streams and torrents, and the bearing of the evidence of base leveling. Discusses hypothesis of base leveling and river spacing.

580 —— [Dikes and veins.]

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581 —— and **Woodworth** (J. B.). Geology of the Richmond Basin, Virginia.

U. S. Geol. Surv., 19th Ann. Rept., Pt. II, pp. 385–520, pls. xviii–lii, figs. 90–116, 1899.

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582 —— —— and **Foerste** (A. F.). Geology of the Narragansett Basin.

U. S. Geol. Surv., Mon. XXXIII, 402 pp., 31 pls., 30 figs., 1899.

Gives a description of the glacial history, the character and occurrence of the Carboniferous, Algonkian, and Cambrian rocks, the geologic structure, and occurrence of coal. Contains a bibliography.

583 **Shimek** (B.). The distribution of loess fossils.

Jour. of Geol., vol. vii, pp. 122–140, 1 fig., 1899.

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584 **Shimek** (B.). The distribution of loess fossils.
Iowa Acad. Sci., Proc., vol. vi, pp. 98–113, 2 figs., 1899.

585 **Siebenthal** (C. E.). The Bedford oolitic limestone.
The Mineral Industry for 1898, vol. vii, pp. 479–482, 1899.
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586 **Simonds** (Frederic W.). Recent publications relating to the geology of Texas.
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587 —— A consideration of the interpretation of unusual events in geologic records illustrated by recent examples.
Abstracts: Am. Assoc. Adv. Sci., Proc., vol. xlviii, p. 227 (½ p.); Science, new ser., vol. x, p. 489 (⅓ p.), 1899.

588 —— [Review of "The Lower Cretaceous Gryphæas of the Texas region," by R. T. Hill and T. W. Vaughan.]
Science, new ser., vol. ix, pp. 110–111, 1899.

589 **Slichter** (C. S.). Theoretical investigations of the motion of ground waters.
U. S. Geol. Surv., 19th Ann. Rept., Pt. II, pp. 295–384, pl. xvii, figs. 54–89, 1899.

590 **Slocum** (Charles E.). The relative ages of the Maumee Glacial lake and the Niagara gorges.
Abstracts: Am. Assoc. Adv. Sci., Proc., vol. xlviii, pp. 227–228 (½ p.); Science, new ser., vol. x, p. 499 (½ p.), 1899.

591 **Slosson** (E. E.), **Knight** (W. C.) and. The oil fields of Crook and Uinta counties, Wyoming.
See Knight (W. C.) and Slosson (E. E.), No. 390.

592 **Smith** (Alva J.). Fusulina cylindrica shell structure.
Kan. Acad. Sci., Trans., pp. 64–65, figs. 1–4, 1899.

593 **Smith** (G. O.), **Tower** (G. W., jr.) and. Geology and mining industry of the Tintic district, Utah.
See Tower (G. W., jr.) and Smith (G. O.), No. 632.

594 —— **Willis** (B.) and. Tacoma folio, Washington.
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595 **Smith** (W. S. Tangier). Some aspects of erosion in relation to the theory of the peneplain.
Univ. of Cal., Dept. of Geol., Bull., vol. ii, pp. 155–178, 1899.
Discusses objections to the theory of peneplains and a modification of the use of the term.

596 **Smyth** (C. H., jr.). Geology of the Adirondack region.

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Describes general character and occurrence of the igneous rocks.

597 **Smyth** (H. L.), **Clements** (J. M.) and. The Crystal Falls iron-bearing district of Michigan.

See Clements (J. M.) and Smyth (H. L.), No. 105.

598 **Springer** (Frank). Notice of a new discovery concerning Uintacrinus.

Am. Geol., vol. xxiv, p. 92, 1899.

Describes peculiar features of Uintacrinus.

599 **Spurr** (Josiah Edward). Lakes Iliamna and Clark. The Nushagak River. The coast from Bristol Bay to the Yukon. The Kuskokwim drainage area. From the Yukon mouth to Point Barrow. The Kowak River, the Noatak River.

U. S. Geol. Surv., Expl. in Alaska, pp. 118–129, 1899.

Notes on routes of travel and occurrence of gold.

600 —— Geology of the Aspen mining district, Colorado.

Review: Am. Geol., vol. xxiv, pp. 307–308, 1899.

See Bibliography and Index for 1898, No. 739*a*.

601 —— and **Post** (W. S.). Report on the Kuskokwim expedition [Alaska].

U. S. Geol. Surv., Expl. in Alaska, pp. 28–39, 1899.

Describes the physiography, the occurrence of volcanic, Juratrias, and Tertiary rocks, and the occurrence of gold-bearing gravels.

602 **Squier** (G. H.). Studies in the driftless region of Wisconsin.

Jour. of Geol., vol. vii, pp. 79–82, 1899.

Describes evidences of glacial action in the region.

603 **Stanton** (Timothy W.). Mesozoic fossils [Yellowstone National Park].

U. S. Geol. Surv., Mon. XXXII, Pt. II, pp. 600–650, pls. lxxii-lxxvi, 1899.

Describes the relations of the faunas of the several horizons and the characters of the fossils collected.

604 **Stearns** (Robert E. C.). Description of a species of Actæon from the Quaternary bluffs at Spanish Bight, San Diego, Cal.

U. S. Nat. Mus., Proc., vol. xxi, pp. 297–299, 1 fig., 1899. Published in 1898.

605 **Stevenson** (John J.). Our society.

Geol. Soc. Am. Bull., vol. x, pp. 83–98, 1899.

Gives a historical sketch of the Geological Society of America and an account of the general results of several official geological surveys.

606 —— [Review of "West Virginia Geological Survey, vol. i, 1899."]

Science, new ser., vol. x, pp. 652–653, 1899.

607 **Stevenson** (John J.). The section at Schoharie, N. Y.

Abstract: Science, new ser., vol. x, pp. 735–736, 1899.

Compares the section with others of the Appalachians in Pennsylvania and Virginia.

608 **Stewart** (Alban). A preliminary description of the opercular and other cranial bones of Xiphactinus Leidy.

Kans. Univ. Quart., vol. viii, pp. 19–21, 1899.

Describes material in the museum of the University of Kansas.

609 —— Pachyrhizodus minimus, a new species of fish from the Cretaceous of Kansas.

Kan. Univ. Quart., vol. viii, pp. 37–38, fig. 1, 1899.

Describes material from Logan County, Kansas.

610 —— Notice of three new Cretaceous fishes, with remarks on the Saurodontidæ Cope.

Kan. Univ. Quart., vol. viii., pp. 107–112, 1899.

611 —— Notes on the osteology of Anogmius polymicrodus Stewart.

Kan. Univ. Quart., vol. viii., pp. 117–121, pl. xxxi, 1899.

612 —— Leptichthys, a new genus of fishes from the Cretaceous of Kansas.

Am. Geol., vol. xxiv, pp. 78–79, 1899.

Describes the genus and one species.

613 **Stone** (George H.). The glacial gravels of Maine and their associated deposits.

U. S. Geol. Surv., Mon. XXXIV, 499 pp., 52 pls., 36 figs., 1899.

Describes the superficial deposits and the character, distribution, classification, and genesis of the glacial gravels. Contains a discussion of the glaciation of the Rocky Mountains.

614 —— Granitic breccias of Grizzly Peak, Cal.

Am. Jour. Sci., 4th ser., vol. vii, pp. 184–186, 1899.

Describes the character and origin of the breccias.

615 —— Dry gold placers of the arid regions.

Mines and Minerals, vol. xix, pp. 397–399, 1899.

Describes occurrence and methods of mining.

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616 **Taff** (Joseph A.). Geology of the McAlester-Lehigh coal field, Indian Territory. Accompanied by a report on the fossil plants by David White, and a report on the Paleozoic invertebrate fossils by George H. Girty.

U. S. Geol. Surv., 19th Ann. Rept., Pt. III, pp. 423–593, pls. lxiv–lxxii, figs. 77–80, 1899.

Describes the physiographic features, character, and structure of the Carboniferous strata, and the occurrence, distribution, and character of the coals of the region.

617 **Taff** (Joseph A.). Albertite-like asphalt in the Choctaw Nation, Indian Territory.

Am. Jour. Sci., 4th ser., vol. viii, pp. 219–224, 1899. Review: Am. Geol., vol. xxiv, p. 318 (¼ p.), 1899.

Describes character and occurrence of the material and the geologic features of the region.

618 —— Changes in the Canadian River in western Choctaw Nation, Indian Territory.

Abstract: Science, new ser., vol. x, p. 26 (¼ p.), 1899.

619 **Tarr** (Ralph S.). Physical geography of New York State. Part VII. The Great Lakes and Niagara.

Am. Geog. Soc. Bull., vol. xxxi, pp. 101–117 (4 figs.), pp. 217–235 (10 figs.), 315–343 (21 figs.), 1899.

Describes the physiographic and glacial geology of the Great Lakes region and includes a bibliography.

620 —— Physical geography of New York State. Part IX. The shore lines.

Am. Geog. Soc. Bull., vol. xxxi, pp. 417–443, 22 figs., 1899.

621 **Taylor** (Frank B.). The great ice dams of Lakes Maumee, Whittlesey, and Warren.

Am. Geol., vol. xxiv, pp. 6–38, pls. ii–iii, 1899. Review: Jour. of Geol., vol. vii, pp. 621–623, 1899.

Describes glacial phenomena in the Great Lakes region.

622 —— The Galt moraine and associated drainage.

Abstracts: Am. Assoc. Adv. Sci. Proc., vol. 48, p. 228 (¾ p.); Science, new ser., vol. x, pp. 489–490 (½ p.), 1899.

623 **Teller** (Edgar S.), **Monroe** (Charles E.) and. The fauna of the Devonian formation at Milwaukee, Wisconsin.

See Monroe (C. E.) and Teller (E. E.), No. 490.

624 **Todd** (James Edward). The moraines of southeastern South Dakota and their attendant deposits.

U. S. Geol. Surv., Bull. No. 158, 165 pp., 27 pls., 31 figs., 1899.

Describes the occurrence and characters of the moraines, loess, and terraces of the region.

625 —— New light on the drift in South Dakota.

Iowa Acad. Sci., Proc., vol. vi, pp. 122–130, pl. v, 1899.

Describes glacial deposits and their relations and fauna in South Dakota.

626 —— The geology of Hubbard County and northwestern portion of Cass County [Minnesota].

Minn. Geol. and Nat. Hist. Surv., Final Rept., vol. 4, pp. 82–97, pls. lix, D–E, 1899.

Describes the glacial geology of the region.

627 **Todd** (James Edward). The geology of Norman and Polk counties [Minnesota].

Minn. Geol. and Nat. Hist. Surv., Final Rept., vol. iv, pp. 98–116, pl. lxii, F–I, fig. 9, 1899.

Describes the physiography and glacial history of the county.

628 —— The geology of Marshall, Roseau, and Kittson counties [Minnesota].

Minn. Geol. and Nat. Hist. Surv., Final Rept., vol. iv, pp. 117–130, pl. lxiii, and J, fig. 10, 1899.

Describes the glacial features of the region.

629 —— The geology of Beltrami County [Minnesota].

Minn. Geol. and Nat. Hist. Surv., Final Rept., vol. iv, pp. 151–155, pl. lxiv, and K–M, figs. 11–15, 1899.

Describes the physiography and occurrence of Archean rocks and glacial deposits of the region.

630 **Tolman** (C. F., jr.). The carbon dioxide of the ocean and its relation to the carbon dioxide of the atmosphere.

Jour. of Geol., vol. vii, pp. 585–618, 1899.

631 —— [Review of "The influence of the carbonic acid of the air upon the temperature of the ground," by Svante Arrhenius.]

Jour. of Geol., vol. vii, pp. 623–625, 1899.

632 **Tower** (George Warren, jr.) and **Smith** (George Otis). Geology and mining industry of the Tintic district, Utah.

U. S. Geol. Surv., 19th Ann. Rept., Pt. III, pp. 601–767, pls. lxxiii–xcix, figs. 81–92, 1899.

Describes the occurrence and character of the Cambrian and Carboniferous strata and igneous rocks, the volcanic and metamorphic phenomena, and the occurrence and origin of the ore bodies.

633 **Turner** (Henry W.). Granitic rocks of the Sierra Nevada.

Jour. of Geol., vol. vii, pp. 141–162, 1 fig., 1899. Abstract: Am. Nat., vol. xxxiii, p. 552, 1899.

Describes occurrence and petrographic and chemical character of biotite-granite, granodiorite, quartz-monzonite, soda-granite, and aplite.

634 —— Replacement ore deposits in the Sierra Nevada.

Jour. of Geol., vol. vii, pp. 389–400, pl. v, 1899.

Describes character and occurrence of certain ore bodies in California and the petrographic character of associated rocks.

635 —— Rock-forming biotites and amphibolites. With analyses by W. F. Hillebrand, H. N. Stokes, and William Valentine.

Am. Jour. Sci., 4th ser., vol. vii, pp. 294–298. Review: Am. Geol., vol. xxiv, p. 181 (½ p.), 1899.

Describes general character of the materials, and gives chemical analyses.

659 **Upham** (Warren). Englacial drift in the Mississippi Basin.
Am. Geol., vol. xxiii, pp. 369–374, 1899.
Describes occurrence and character of englacial drift in Hudson Bay and Upper Mississippi Valley regions.

660 —— [Review of "Summary report of the Geological Survey department of Canada for the year 1898," by G. M. Dawson.]
Am. Geol., vol. xxiii, pp. 384–385, 1899.

661 —— [Review of "Wells of northern Indiana," by Frank Leverett.]
Am. Geol., vol. xxiii, p. 385 (½ p.), 1899.

662 —— [Review of "The fossil bison of North America," by Frederick A. Lucas.]
Am. Geol., vol. xxiii, p. 385 (5 l.), 1899.

663 —— [Review of "West Virginia Geological Survey, vol. i," by I. C. White.]
Am. Geol., vol. xxiii, pp. 387–389, 1899.

664 —— Glacial history of the New England Islands, Cape Cod, and Long Island.
Am. Geol., vol. xxiv, pp. 79–92, 1899.
Describes epeirogenic movements causing glaciation, the subsequent deformation of the region, and the character and distribution of the glacial deposits. Includes a bibliography of the subject.

665 —— [Review of "Eighteenth Annual Report of the United States Geological Survey".]
Am. Geol., vol. xxiv, pp. 122–125, 1899.

666 —— [Review of "Iowa Geological Survey, vol. ix".]
Am. Geol., vol. xxiv, pp. 182–184, 1899.

667 —— [Review of "Nineteenth Annual Report of the United States Geological Survey" and "Geological Survey of New Jersey, Annual Report for the year 1898."]
Am. Geol., vol. xxiv, pp. 251–253, 1899.

668 —— [Reviews of "Some Glacial wash-plains of southern New England," by J. B. Woodworth, and "The mechanical composition of wind deposits," by J. A. Udden.]
Am. Geol., vol. xxiv, pp. 381–382, 1899.

V.

669 **Van Hise** (C. R.). Introduction. [The Crystal Falls iron-bearing district of Michigan.]
U. S. Geol. Surv., Mon. XXXVI, pp. xvii–xxxvi; 19th Ann. Rept., Pt. III, pp. 9–18, 1899.
Describes the general character, occurrence, structure, and correlation of the Upper and Lower Huronian series in this region.

670 **Van Hise** (C. R.). The naming of rocks.
Jour. of Geol., vol. vii, pp. 686-699, 1899.
Discusses criteria and proposes a plan for naming rocks.

671 **Vaughan** (T. Wayland). Geologic notes on the Wichita Mountains, Oklahoma, and the Arbuckle Hills, Indian Territory.
Am. Geol., vol. xxiv, pp. 41-55, 1899.
Describes the physiographic features of the region, the character and occurrence of Silurian and Carboniferous strata and igneous rocks.

672 —— Some Cretaceous and Eocene corals from Jamaica.
Harvard Coll., Mus. Comp. Zool., Bull., vol. xxxiv, Appendix, pp. 227-250, 1899.
Reviews the literature on the corals from this region, and describes material collected by R. T. Hill.

673 **Veatch** (Arthur C.). The Shreveport area [Louisiana].
La. Exp. Stat., Part V, pp. 149-208, pls. xiv-xix, 1899.
Describes the physiography of the region and the occurrence of Tertiary deposits.

674 —— The five islands [Louisiana].
La. Exp. Stat., Part V, pp. 209-262, pls. xx-xxxi, 1899.
Describes the topographic and geologic features of the region and the occurrence of salt.

675 —— **Harris** (G. D.) and. General geology [of Louisiana].
See Harris (G. D.) and Veatch (A. C.). No. 283.

676 —— —— Historical review [of geological literature of Louisiana].
See Harris (G. D.) and Veatch (A. C.). No. 282.

677 **Vermeule** (C. C.). Water supply from wells [New Jersey].
N. J. Geol. Surv., Rept. for 1898, pp. 145-182, figs. 11-20, 1899.
Describes conditions which produce flowing wells and the progress of inflow through material about a well.

678 **Vogdes** (A. W.). Biographical sketch of Issachar Cozzens, jr.
Am. Geol., vol. xxiv, pp. 327-328, pl. xv, 1899.
Gives a sketch of his life.

W.

679 **Wagner** (George). On Tetracaulodon (Tetrabelodon) shepardii Cope.
Kan. Univ. Quart., vol. viii, pp. 99-103, pls. xxiv-xxv, 1899.
Describes material from the Loup Fork beds of Kansas and reviews literature of the subject.

680 **Walcott** (Charles Doolittle). Report of the Director of the United States Geological Survey for the fiscal year ending June 30, 1899.
U. S. Geol. Surv., 20th Ann. Rept., Pt. I., 551 pp., 2 pls., 1899.
Gives a general review of the work undertaken by the Survey during the year 1898-99.

681 **Walcott** (Charles Doolittle). Pre-Cambrian fossiliferous formations.

Geol. Soc. Am., Bull., vol. x, pp. 199–244, pls. xxii–xxviii, 1899. Reviews: Am. Jour. Sci., 4th ser., vol. viii, pp. 78–79; Science, new ser., vol. ix, p. 143 (½ p.), 1899.

Describes the character and occurrence of pre-Cambrian strata and the fossils collected.

682 —— Cambrian fossils [Yellowstone National Park].

U. S. Geol. Surv., Mon. XXXII, Pt. II, pp. 440–478, pls. lx–lxv. 1899.

Gives a summary of the faunas and descriptions of the Cambrian fossils collected.

683 —— Cambrian Brachiopoda, Obolus, and Lingulella, with description of new species.

U. S. Nat. Mus., Proc., vol. xxi, pp. 385–420, pls. xxvi–xxviii, 1899. Published in 1898.

684 —— Fossil Medusæ.

Abstracts: Am. Geol., vol. xxii, pp. 57–61; Jour. of Geol., vol. vii, p. 99, 1899.

See Bibliography and Index for 1898. No. 844.

685 **Walker** (T. L.). Crystal symmetry of the mica group.

Am. Jour. Sci., 4th ser., vol. vii, pp. 199–204, figs. 1–6, 1899.

Describes methods of study of crystal symmetry and discusses evidence of some of the micas belonging to the triclinic system.

686 —— Causes of variation in the composition of igneous rocks.

Review: Am. Geol., vol. xxiii, pp. 327–328 (½ p.), 1899.

687 **Ward** (H. L.). New Kansas meteorite.

Am. Jour. Sci., 4th ser., vol. vii, p. 233, 1 fig., 1899.

Briefly describes the material.

688 —— Notice of a new meteorite from Murphy, Cherokee County, North Carolina.

Am. Jour. Sci., 4th ser., vol. viii, pp. 225–226, pl. iv, 1899.

Describes occurrence and character of the material.

689 —— Notice of an aerolite that recently fell at Allegan, Michigan.

Am. Jour. Sci., 4th ser., vol. viii, pp. 412–414, 1899.

Describes occurrence and character of the material.

690 **Ward** (Lester F.). The Cretaceous formation of the Black Hills as indicated by the fossil plants (with the collaboration of W. P. Jenney, W. M. Fontaine, and F. H. Knowlton).

U. S. Geol. Surv., 19th Ann. Rept., Pt. II, pp. 521–946, pls. liii–clxxii, figs. 117–122, 1899. Review: Jour. of Geol., vol. vii, pp. 814–815, 1899.

Reviews literature on the Black Hills, gives a historical sketch of the discovery of the fossils and numerous sections of the strata and descriptions of the fossils.

691 **Ward** (Lester F.). Descriptions of the species of Cycadeoidea or fossil Cycadean trunks thus far determined from the Lower Cretaceous rim of the Black Hills.

U. S. Nat. Mus., Proc., xxi, pp. 195–229, 1899. Published in 1898.

692 **Warren** (C. H.), **Penfield** (S. L.) and. Some new minerals from the zinc mines at Franklin, N. J., and note concerning the chemical composition of ganomalite.

See Penfield (S. L.) and Warren (C. H.), No. 522.

693 ——— Chemical composition of parisite and a new occurrence of it in Ravalli Co., Montana.

See Penfield (S. L.) and Warren (C. H.), No. 521.

694 **Washington** (Henry S.). The petrographical province of Essex County, Massachusetts, II.

Jour. of Geol., vol. vii, pp. 53–64, 1899.

Describes the megascopic, microscopic, and chemical characters of essexite, diorite, and gabbro.

695 —— The petrographical province of Essex County, Massachusetts, III.

Jour. of Geol., vol. vii, pp. 105–121, 1899.

Describes the petrographic and chemical character of aplite, quartz-syenite-porphyry, paisanite, sölvsbergite, tinguaite, and dike rocks.

696 —— The petrographical province of Essex County, Massachusetts, IV.

Jour. of Geol., vol. vii, pp. 284–294, 1899.

Describes petrographic and chemical character of camptonite, diabase, rhyolite, and keratophyr.

697 —— Petrographical province of Essex County, Massachusetts, V. (General discussion and conclusion.)

Jour. of Geol., vol. vii, pp. 463–482, pl. vi, 1899. Review: Am. Geol., vol. xxiv, pp. 255–257, 1899.

Gives a general summary of previous papers.

698 **Watson** (Thomas L.). Some notes on the lakes and valleys of the Upper Nugsuak Peninsula, North Greenland.

Jour. of Geol., vol. vii, pp. 655–666, 3 figs., 1899.

Describes physiographic features of the region and the occurrence and origin of the lake.

699 —— Some further notes on the weathering of diabase in the vicinity of Chatham, Virginia.

Am. Geol., vol. xxiv, pp. 355–369, 1899.

Discusses the evidences of the cause of the considerable loss of alumina in the change from fresh to decomposed diabase. Includes many chemical analyses.

700 **Watts** (W. L.). Notes on the oil-yielding formations of California.

Min. and Sci. Press, vol. lxxix, pp. 144–146 (12 figs.), pp. 172–173 (3 figs.), 1899. Describes character and occurrence.

701 **Weed** (Walter Harvey). Fort Benton folio, Montana.

U. S. Geol. Surv., Geol. Atlas of U. S., folio No. 55, 1899.

Describes the general geologic features and the occurrence and character of the Archean, Cambrian, Silurian, Devonian, Carboniferous, Juratrias, Cretaceous, Pleistocene, and igneous rocks. Discusses the geologic history of the region, and describes the occurrence of coal, gold, and silver. Includes topographic maps and columnar sections.

702 —— Little Belt Mountains folio, Montana.

U. S. Geol. Surv., Geol. Atlas of U. S., folio No. 56, 1899.

Describes the physiography, the occurrence, and character of the Archean, Algonkian, Cambrian, Silurian, Devonian, Carboniferous, Juratrias, Cretaceous, metamorphic, and igneous rocks, the general geologic relations and history of the region, and the occurrence of coal, silver, and sapphires. Includes topographic and geologic maps and columnar sections.

703 —— Geology of the southern end of the Snowy Range [Yellowstone National Park].

U. S. Geol. Surv., Mon. XXXII, Pt. II, pp. 203–214, pl. xxvi, 1899.

Describes the general physiographic and geologic features of the region.

704 —— Granite rocks of Butte, Montana, and vicinity.

Jour. of Geol., vol. vii, pp. 737–750, 1899.

Describes occurrence and petographic and chemical characters of the granitic rocks.

705 —— Laccoliths and bysmaliths.

Abstract: Science, new ser., vol. x, pp. 25–26, 1899.

706 —— **Iddings** (J. and. P.) Descriptive geology of the northern end of the Teton Range [Yellowstone National Park].

See Iddings (J. P.) and Weed (W. H.). No. 355.

707 —— —— Descriptive geology of the Gallatin Mountains [Yellowstone National Park].

See Iddings (J. P.) and Weed (W. H.). No. 354.

708 **Weeks** (Fred Boughton). Bibliography and index of geology, paleontology, petrology, and mineralogy for 1898.

U. S. Geol. Surv., Bull., No. 162, 163 pp., 1899.

Contains list of titles of papers arranged alphabetically by authors' names and a subject index.

709 —— The duplication of geologic formation names.

Jour. of Geol., vol. vii, pp. 297–299; Am. Geol., vol. xxiii, pp. 266–267; Science, new ser., vol. ix, pp. 625–626, 1899.

Gives reference to literature showing the duplication of long-established names in recent publications.

710 —— [A reconnaissance in Jackson Basin, northwest Wyoming.]

Abstract: Science, new ser., vol. ix, p. 454 (⅓ p.), 1899.

711 **Weller** (Stuart). Kinderhook faunal studies, I. The fauna of the Vermicular sandstone at Northview, Webster County, Missouri.

St. Louis Acad. Sci., Trans., vol. ix, No. 2, pp. 9–51, pls. ii–vi, 1899.

Describes the occurrence of the formation and the character of the fossils collected.

712 —— [Review of "Fossil Medusæ," by C. D. Walcott.]

Jour. of Geol., vol. vii, p. 99, 1899.

713 —— [Review of "Fifteenth Annual Report of the State Geologist [New York] for the year 1895, vol. i."]

Jour. of Geol., vol. vii, pp. 209–213, 1899.

714 —— A peculiar Devonian deposit in northeastern Illinois.

Jour. of Geol., vol. vii, pp. 483–488, 3 figs., 1899.

Describes occurrence of a Devonian fauna in crevices of Niagara strata.

715 —— A century of progress in Paleontology.

Jour. of Geol., vol. vii, pp. 496–508, 1899.

Gives a general historical sketch of the development of the science of Paleontology.

716 —— [Review of "The Paleozoic reticulate sponges constituting the family Dictyospongidæ," by James Hall and J. M. Clarke.]

Jour. of Geol., vol. vii, pp. 717–718, 1899.

717 **Westgate** (Lewis G.). A granite-gneiss in central Connecticut.

Jour. of Geol., vol. vii, pp. 638–654, 4 figs., 1899.

Describes occurrence, the associated rocks, and its megascopic and microscopic characters.

718 **Wheeler** (William Morton). George Baur's life and writings.

Am. Nat., vol. xxxiii, pp. 15–30, 1899.

Gives a sketch of his life and list of his publications.

719 **White** (David). Report on fossil plants from the McAlester coal field, Indian Territory, collected by Messrs. Taff and Richardson in 1897.

U. S. Geol. Surv., 19th Ann. Rept., Pt. III, pp. 457–534, pls. lxvii–lxviii, 1899.

Describes the geographic distribution of the fossil plants and their occurrence in the coal beds, and compares these floras with those from the coal field of Arkansas. Includes descriptions of the species collected.

720 —— Fossil flora of the Lower Coal Measures of Missouri.

U. S. Geol. Surv., Mon. XXXVII, 467 pp., 73 pls., 1899.

Describes the stratigraphy of the plant-bearing beds, the characters of the fossils collected and the relations of the faunas.

721 —— [Review of "Fossil plants, for students of botany and geology," by A. C. Seward.]

Am. Geol., vol. xxiii, pp. 195–197, 1899.

722 **White** (I. C.). Petroleum and natural gas [West Virginia].

West. Va. Geol. Surv., vol. i, pp. 123–378, 1899. Review: Am. Geol., vol. xxiii, pp. 387–389, 1899.

Gives a historical sketch of the subject and describes the occurrence of petroleum and natural gas, including sections of many wells.

723 —— Origin of grahamite.

Geol. Soc. Am., Bull., vol. x, pp. 277–284, pl. xxix, 1899. Reviews: Am. Geol., vol. xxiii, p. 101 (⅓ p.), vol. xxiv, pp. 253–254; Science, new ser., vol. ix, p. 138 (½ p.), 1899.

Describes occurrence and origin.

724 **White** (Theodore G.). Faunas of Upper Ordovician in Lake Champlain Valley.

Abstracts: Am. Geol., vol. xxiii, p. 96 (¼ p.); Science, new ser., vol. ix, p. 102 (½ p.), 1899.

725 **Whiteaves** (J. F.). Postscript to "A description of new genus and species of Cystideans from the Trenton limestone at Ottawa."

Can. Rec. Sci., vol. vii, pp. 395–396, 1898.

Proposes generic name Steganoblastus for that of Astrocystites canadensis.

726 —— On some remains of a sepia-like cuttlefish from the Cretaceous rocks of the South Saskatchewan.

Can. Rec. Sci., vol. vii, pp. 459–461, pl. ii, 1898.

Describes Actinosepia canadensis n. gen. et. sp.

727 —— Note on a fish tooth from the Upper Arisaig series of Nova Scotia.

Can. Rec. Sci., vol. vii, pp. 461–462, 1 fig., 1898.

728 —— A recent discovery of rocks of the age of the Trenton formation at Akpatok Island, Ungava Bay, Ungava.

Am. Jour. Sci., 4th ser., vol. vii, pp. 433–434, 1899.

Gives a list of the fossils collected and discusses their relation to the fauna of the Manitoba.

729 —— The Devonian system in Canada.

Am. Assoc. Adv. Sci., Proc., vol. xlviii, pp. 193–233; Am. Geol., vol. xxiv, pp. 210–240; Science, new ser., vol. x, pp. 402–412, 430–438, 1899.

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730 **Whitfield** (R. P.). Assisted by E. O. Hovey. Catalogue of the type figured specimens in the Paleontological collection of the geological department, American Museum of Natural History.

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731 **Whittle** (Charles L.). The building and road stones of Massachusetts.

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Describes character and occurrence of granite, sandstone, and other building stones.

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Eng. and Min. Jour., vol. lxviii, pp. 215–216, 1899.
Describes general geologic structure of the region.

733 **Wieland** (G. R.). A study of some American fossil cycads, Part I. The male flower Cycadeoidea.
Am. Jour. Sci., 4th ser., vol. vii, pp. 219–226, 2 figs., pls. ii–iv, 1899.
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734 —— A study of some American fossil cycads, Part II. The leaf structure of Cycadeoidea.
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742 —— [Review of "The age of the Franklin white limestone of Sussex County, New Jersey," by J. E. Wolff and A. H. Brooks; "The development of Lytoceras and Phylloceras," by J. P. Smith.]

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744 **Willis** (Bailey). The new Maryland Geological Survey.

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Reviews vol. i of the Maryland Geological Survey.

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U. S. Geol. Surv., Geol. Atlas of U. S., folio No. 54, 1899.

Describes the general physiographic and geologic relations, geologic history, the occurrence and character of the Tertiary and Pleistocene deposits and eruptive rocks, and the occurrence of coal. Includes topographic and geologic maps and structural and columnar sections.

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Describes characters of Platecarpus.

748 —— A new genus of fishes from the Niobrara Cretaceous.

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750 —— Notes on the coraco-scapula of Eryops Cope.

Kan. Univ. Quart., vol. viii, pp. 185–186, pls. xxvii–xxx, 1899.

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751 —— [Review of "West Virginia Geological Survey, vol. i."]

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752 —— Prof. Benjamin F. Mudge.

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754 **Willmott** (A. B.), **Coleman** (A. P.) and. Michipicoton iron range.
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756 **Winchell** (Newton H.). Preface [to Final Rept., vol. iv, Minnesota Geological and Natural History Survey, pp. xiii–xx, 1899].
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758 —— The geology of the southern portion of St. Louis County [Minnesota].
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761 —— The geology of the Hibbing plate of the Mesabi Iron Range [Minnesota].
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764 —— The geology of the Partridge River plate of the Mesabi Iron Range [Minnesota].

Minn. Geol. and Nat. Hist. Surv., Final Rept., vol. iv, pp. 383–389, pl. lxxvi, 1899.

Describes the character and occurrence of the Archean and Cambrian rocks of the region.

765 —— The geology of the Dunka River plate of the Mesabi Iron Range [Minnesota].

Minn. Geol. and Nat. Hist. Surv., Final Rept., vol. iv, pp. 390–398, pl. lxxvii, 1899.

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766 —— The geology of the Pigeon Point plate [Minnesota].

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767 —— The geology of the Vermilion Lake plate [Minnesota].

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Describes the physiography and the character and occurrence of the Archean and iron-bearing rocks.

768 —— The geology of the Carlton plate [Minnesota].

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769 —— The geology of the Duluth plate [Minnesota].

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770 —— List of rock samples, with annotations, collected by N. H. Winchell, in 1896, 1897, and 1898.

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771 —— Thalite and bowlingite from the north shore of Lake Superior.

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Am. Geol., vol. xxiii, p. 330, 1899.

778 —— [Review of "The characters of crystals: an introduction to physical crystallography," by Alfred J. Moses.]
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779 —— [Review of "Minerals in rock sections; the practical methods of identifying minerals in rock sections with the microscope; especially arranged for students in technical and scientific schools," by L. M. Luquer.]
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780 **Winchell** (H. V.) and **Grant** (U. S.). Preliminary report on the Rainy Lake gold region. [Minnesota.]
Minn. Geol. and Nat. Hist. Surv., Final Rept., vol. iv, pp. 192–211, pls. N–O, 1899.
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781 **Witter** (F. M.). Observations on the geology of Steamboat Springs, Colorado.
Iowa Acad. Sci., Proc., vol. vi, pp. 93–98, 1899.
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782 **Wolff** (John E.). On hardystonite, a new calcium zinc silicate from Franklin Furnace, New Jersey.
Am. Acad. Arts and Sci., Proc., vol. xxxiv, pp. 479–481, 1899. **Review:** Am. Geol., vol. xxiii, p. 329 (¼ p.), 1899.
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783 **Wolff** (John E.). Hardystonite, a new mineral from Franklin Furnace [New Jersey].

Abstract: Science, new ser., vol. ix, p. 519 (10 l.), 1899.

784 **Woodman** (J. Edmund). Studies in the gold-bearing slates of Nova Scotia.

Bost. Soc. Nat. Hist., Proc., vol. xxviii, pp. 375–407, 3 pls., 1 fig., 1899.

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785 —— Shore development in the Bras d'Or lakes.

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786 —— Ore-bearing schists of middle and northern Cape Breton.

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788 **Woodworth** (J. B.). The ice contact in the classification of glacial deposits.

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791 —— **Shaler** (N. S.), **Foerste** (A. F.) and. Geology of the Narragansett Basin.

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792 —— —— Geology of the Richmond Basin, Virginia.

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    Altamont moraine, Todd, No. 624.
    Animikie, Grant, Nos. 234, 238, 240, 242, 247.
    Animikie, McInnes, No. 456.
    Animikie, Winchell, Nos. 760, 763, 764, 765, 766.

Geologic formations described—Continued.
Animosa, Norton, No. 501.
Apishapa formation, Hills, No. 319.
Aquidneck shales, Shaler, Woodworth, and Foerste, No. 582.
Arago formation, Diller, No. 157.
Arikaree formation, Darton, No. 139.
Ashton schists, Shaler, Woodworth, and Foerste, No. 582.
Atchison shale, Keyes, No. 378.
Atchison shale, Prosser, No. 535.
Atlantosaurus beds, Marsh, No. 463.
Attleboro sandstone, Shaler, Woodworth, and Foerste, No. 582.
Avalon terrane, Walcott, No. 681.
Ballard, Hill, 313.
Barbican, Hill, No. 313.
Barker formation, Weed, Nos. 701, 702.
Barker porphyry, Weed, Nos. 701, 702.
Barrington clays, Fuller, No. 195.
Bassimenan lake granite, Winchell, No. 760.
Becraft limestone, Clarke and Schuchert, No. 101.
Bed-rock series, Turner and Ransome, No. 638.
Beekmantown limestone, Clarke and Schuchert, No. 101.
Belt formation, Weed, No. 702.
Benton formation, Darton, No. 139.
Bethany limestone, Keyes, No. 378.
Berkshire schist, Dale, No. 134.
Beulah clays, Ward, No. 690.
Black Patch grit, Dale, No. 134.
Black River limestone, Clarke and Schuchert, No. 101.
Blackstone series, Shaler, Woodworth, and Foerste, No. 582.
Bloomington moraine, Leverett, No. 431.
Bluebird aplite, Weed, No. 704.
Blue Hills shale, Logan, No. 439.
Blue Mountain series, Hill, No. 313.
Boggy shale, Taff, No. 616.
Bogue Island formation, Hill, No. 313.
Bohemia conglomerate, Hubbard, No. 343.
Bonair conglomerate lentil, Campbell, No. 80.
Bone Lake crystalline schists, Clements and Smyth, No. 105.
Bowden formation, Hill, No. 313.
Brito formation, Hayes, No. 296.
Brule clay, Darton, No. 139.
Brunswick beds, Kümmel, No. 396.
Buchanan gravels, Beyer, No. 49.
Buff Bay beds, Hill, No. 313.
Butte granite, Weed, No. 704.
Cabotian, Grant, No. 234.
Cabotian, Winchell, No. 769.
Cabotian lavas, Winchell, No. 758.
Cache Creek formation, Dawson, No. 150.
Calaveras formation, Turner and Ransome, No. 639.
Cambric, Clarke and Schuchert, No. 101.
Cambridge formation, Hill, No. 313.
Camden chert, Safford and Schuchert, No. 559.
Canadian, Clarke and Schuchert, No. 101.
Cantwell conglomerate, Eldridge and Muldrow, No. 172.
Cape John sandstones, Ami, No. 9.
Carlile shale, Hills, No. 319.

Geologic formations described—Continued.
Cascade formation, Weed, Nos. 701, 702.
Castle granite, Weed, No. 702.
Catadupa beds, Hill, No. 313.
Catskill sandstone, Clarke and Schuchert, No. 101.
Cayugan, Clarke and Schuchert, No. 101.
Cedar Valley limestone, Udden, No. 642.
Cedar Valley stage, Norton, No. 501.
Cerro Gordo moraine, Leverett, No. 431.
Chadron formation, Darton, No. 139.
Champaign moraine, Leverett, No. 431.
Champlainic, Clarke and Schuchert, No. 101.
Chapelton beds, Hill, No. 313.
Chase formation, Prosser, No. 535.
Chattanooga shale, Campbell, No. 80.
Chautauquan, Clarke and Schuchert, No. 101.
Chazy limestone, Clarke and Schuchert, No. 101.
Chemung, Luther, No. 449.
Chemung beds, Clarke and Schuchert, No. 101.
Cherokee shales, Orton, No. 505.
Cheshire quartzite, Emerson, No. 176.
Chesterfield group, Shaler and Woodworth, No. 581.
Cheyenne sandstone, Prosser, No. 536.
Chuar terrane, Walcott, No. 681.
Cincinnatian, Clarke and Schuchert, No. 101.
Clear Creek limestone, Safford and Schuchert, No. 559.
Clinton, Gilbert, No. 217.
Clinton beds, Clarke and Schuchert, No. 101.
Clinton group, Luther, No. 449.
Coaledo formation, Diller, No. 157.
Coal Measures, Beede, No. 45.
Coal Measures, White, No. 719.
Coastal series, Hill, No. 313.
Coasters Harbor Island arkose, Shaler, Woodworth, and Foerste, No. 582.
Cobre formation, Hill, No. 313.
Coeyaman limestone, Clarke and Schuchert, No. 101.
Coldwater shales, Lane, No. 418.
Coles Brook limestone, Emerson, No. 176.
Colorado formation, Weed, No. 701.
Conanicut arkose, Shaler, Woodworth, and Foerste, No. 582.
Conception slate, Walcott, No. 681.
Copper Mountain greenstone, Schrader, No. 570.
Cottonwood limestone, Keyes, No. 378.
Courtland quartzite, Hall, No. 272.
Coutchiching, Grant, No. 247.
Coutchiching, McInnes, No. 456.
Coutchiching, Winchell and Grant, No. 780.
Cranston beds, Shaler, Woodworth, and Foerste, No. 582.
Cumberland quartzite, Shaler, Woodworth, and Foerste, No. 582.
Dakota, Bain, No. 21.
Dakota formation, Cross, No. 128.
Dakota formation, Weed, No. 701.
Dakota sandstone, Darton, No. 139.
Dakota sandstone, Hills, No. 319.
Dakota sandstone, Ward, No. 690.
Davenport beds, Norton, No. 501.
Des Moines, Bain, No. 21.

Geologic formations described—Continued.
Des Moines, Macbride, No. 450.
Des Moines, Udden, No. 642.
Des Moines stage, Beyer, No. 49.
Devonic, Clarke and Schuchert, No. 101.
Dielasma beds, Norton, No. 501.
Dighton conglomerate group, Shaler, Woodworth, and Foerste, No. 582.
Dolores formation, Cross, No. 128.
Dundee limestone, Lane, No. 418.
Eagle formation, Weed, No. 701.
East Lee limestone, Emerson, No. 176.
Eastern sandstone, Hubbard, No. 343.
Ellis formation, Weed, Nos. 701, 702.
Empire formation, Diller, No. 157.
Empire shales, Walcott, No. 681.
Erian, Clarke and Schuchert, No. 101.
Esopus grit, Clarke and Schuchert, No. 101.
Etcheminian terrane, Matthew, No. 469.
Eureka limestone, Tower and Smith, No. 632.
Falmouth formation, Hill, No. 313.
Favette breccia, Udden, No. 642.
Flathead formation, Hague, No. 268.
Fond du Lac sandstone, Winchell, No. 769.
Forbes limestone, Keyes, No. 378.
Fort Benton group, Logan, No. 439.
Fort Hays limestone, Logan, No. 439.
Franciscan series, Anderson, No. 16.
Frankenfield, Hill, No. 313.
Gale sand, Willis and Smith, No. 746.
Gallatin limestone, Hague, No. 268.
Gary moraine, Todd, No. 624.
Genesee shale, Clarke and Schuchert, No. 101.
Genesee slate, Luther, No. 449.
Georgia slates, Clarke and Schuchert, No. 101.
Georgian, Clarke and Schuchert, No. 101.
Gering formation, Darton, No. 139.
Godiva limestone, Tower and Smith, No. 632.
Goose Pond limestone, Emerson, No. 176.
Gower stage, Norton, No. 501.
Grand Canyon series, Walcott, No. 681.
Grand Gulf, Harris and Veatch, No. 283.
Grand Portage graywacke, Winchell, No. 766.
Graneros shale, Hills, No. 319.
Grenville series, Barlow, No. 32.
Greyson shale, Walcott, No. 681.
Groveland formation, Clements and Smyth, No. 105.
Groveland formation, Van Hise, No. 669.
Guertie sand, Taff, No. 616.
Guelph dolomite, Clarke and Schuchert, No. 101.
Gunnison formation, Cross, No. 128.
Hamilton beds, Clarke and Schuchert, No. 101.
Hamilton group, Grabau, No. 230.
Hamilton group, Luther, No. 449.
Hartshorne sandstone, Taff, No. 616.
Hay Creek coal formation, Ward, No. 690.
Helderbergian, Clarke and Schuchert, No. 101.
Helena limestone, Walcott, No. 681.
Hemlock formation, Clements, No. 104.
Hemlock formation, Clements and Smyth, No. 105.
Highwood syenite, Weed, No. 701.
Hill River moraine, Todd, No. 629.
Hinckley sandstone, Winchell, No. 757.

Geologic formations described—Continued.
Hinsdale gneiss and limestone, Emerson, No. 176.
Hoosac schist, Emerson, No. 176.
Hop Brook limestone, Emerson, No. 176.
Hudson shale, Dale, No. 134.
Hudson River group, Luther, No. 449.
Humbug series, Tower and Smith, No. 632.
Huronian, Barlow, No. 32.
Huronian (Lower) series, Clements and Smyth, No. 105.
Huronian series, Van Hise, No. 669.
Illinoian drift, Calvin, No. 78.
Illinoian drift, Leverett, No. 431.
Illinoian till, Udden, No. 642.
Independence shale, Norton, No. 501.
Inwood limestone, Eckel, No. 168.
Iola limestone, Keyes, No. 378.
Iowan drift, Calvin, No. 78.
Iowan drift, Leverett, No. 431.
Ishpeming formation, Van Hise, No. 669.
Itasca moraine, Todd, No. 629.
Ithaca beds, Clarke and Schuchert, No. 101.
Jackson, Harris and Veatch, No. 283.
Jackson series, Lane, No. 418.
Jefferson limestone, Hague, No. 268.
Jerusalem, Hill, No. 313.
Kansan drift, Bain, Nos. 21, 22.
Kansan drift, Beyer, No. 49.
Kansan drift, Calvin, No. 78.
Kansan drift, Macbride, No. 450.
Kansan till, Norton, No. 501.
Kansan till, Udden, No. 642.
Kearsarge conglomerate, Hubbard, No. 343.
Keewatin, Grant, Nos. 239, 241, 247.
Keewatin, McInnes, No. 456.
Keewatin, Winchell, Nos. 760, 764, 767.
Keewatin, Upper and Lower, Winchell, No. 756.
Keewatin, Winchell and Grant, No. 780.
Kenai series, Eldridge and Muldrow, No. 172.
Kendal Green slate, Hobbs, No. 320.
Keweenaw series, Lane, No. 417.
Keweenaw series, Walcott, No. 681.
Keweenawan, Grant, Nos. 234, 238, 240, 241, 242.
Keweenawan, Winchell, Nos. 757, 766.
Kinderhook limestone, Macbride, No. 450.
Kingston beds, Clarke and Schuchert, No. 101.
Kingston formation, Hill, No. 313.
Kingstown series, Shaler, Woodworth, and Foerste, No. 582.
Klutena series, Schrader, No. 570.
Kona dolomite, Van Hise, No. 669.
Ladentown trap, Kümmel, No. 395.
Lafayette, Harris, and Veatch, No. 283.
Lake Bonneville beds, Tower and Smith, No. 633.
Lake Ketihi moraine, Todd, No. 629.
La Plata formation, Cross, No. 128.
Laramie formation, Hills, No. 319.
Laramie formation, Weed, No. 702.
Laurentian, Barlow, No. 32.
Laurentian, McInnes, No. 456.
Laurentian, Winchell and Grant, No. 780.
Lawrence shale, Keyes, No. 378.
Le Claire beds, Norton, No. 501.

Geologic formations described—Continued.
  Lee formation, Campbell, No. 80.
  Lee gneiss, Emerson, No. 176.
  Lignitic, Harris and Veatch, No. 283.
  Lincoln slate, Hobbs, No. 320.
  Little Compton shales, Shaler, Woodworth, and Foerste, No. 582.
  Livingston formation, Weed, No. 702.
  Lockatong group, Kümmel, No. 396.
  Lockport limestone, Clarke and Schuchert, No. 101.
  Loco diorite, Weed, No. 702.
  Loess, Bain, No. 21.
  Loess, Beyer, No. 49.
  Loess, Hall and Sardeson, No. 274.
  Loess, Norton, No. 501.
  Loess, Shaler, No. 577.
  Loess, Todd, No. 624.
  Loess, Udden, No. 642.
  Loess formation, Sardeson, No. 566.
  Loess formation, Shimek, No. 583.
  Logie Green, Hill, No. 313.
  Lorraine beds, Clarke and Schuchert, No. 101.
  Lower Claiborne, Harris and Veatch, No. 283.
  Lower Helderberg, Girty, No. 222.
  Lower Magnesian limestone, Buckley, No. 73.
  Lowerre quartzite, Eckel, No. 168.
  Lowville limestone, Clarke and Schuchert, No. 101.
  McAlester shale, Taff, No. 616.
  McElmo formation, Cross, No. 128.
  Machuca formation, Hayes, No. 296.
  Madison limestone, Hague, No. 268.
  Madison limestone, Weed, Nos. 701, 702.
  Manchioneal formation, Hill, No. 313.
  Mancos shale, Cross, No. 128.
  Manhattan schist, Eckel, No. 168.
  Manitou, Grant, No. 234.
  Manitou series, Winchell, Nos. 760, 766.
  Manlius limestone, Clarke and Schuchert, No. 101.
  Mansfield formation, Clements, No. 104.
  Mansfield formation, Clements and Smyth, No. 105.
  Marcellus shale, Clarke and Schuchert, No. 101.
  Marion formation, Prosser, No. 535.
  Marseilles moraine, Leverett, No. 431.
  Marsh shales, Walcott, No. 681.
  Marshall series, Lane, No. 418.
  Marquette series, Van Hise, No. 669.
  Matanuska series, Mendenhall, No. 475.
  May Pen beds, Hill, No. 313.
  Medina, Gilbert, No. 217.
  Medina sandstone, Clarke and Schuchert, No. 101.
  Medina sandstone, Luther, No. 449.
  Mesnard quartzite, Van Hise, No. 669.
  Michigamme formation, Van Hise, No. 669.
  Michigan series, Lane, No. 418.
  Midland sands, Willis and Smith, No. 746.
  Midway, Harris and Veatch, No. 283.
  Millers River conglomerate, Shaler, Woodworth, and Foerste, No. 582.
  Minho beds, Hill, No. 313.
  Mississippian series, Beyer, No. 49.
  Mohawkian, Clarke and Schuchert, No. 101.
  Momable slate, Walcott, No. 681.
  Monarch formation, Weed, Nos. 701, 702.
  Moneague formation, Hill, No. 313.
  Monroe, Lane, No. 418.
  Montana formation, Hague, No. 268.
  Montana formation, Weed, No. 701.
  Montego formation, Hill, No. 313.
  Montpelier beds, Hill, No. 313.
  Naparima marls, Harrison and Jukes-Browne, No. 284.
  Naples beds, Clarke and Schuchert, No. 101.
  Nasina series, Peters and Brooks, No. 524.
  Natick conglomerate, Shaler, Woodworth, and Foerste, No. 582.
  Negaunee formation, Van Hise, No. 669.
  Neihart porphyry, Weed, No. 702.
  Neihart quartzite, Weed, No. 702.
  Neihart quartzite and sandstone, Walcott, No. 681.
  Newark system, Kümmel, Nos. 395, 396.
  New Glasgow conglomerate, Ami, No. 9.
  Newland limestone, Walcott, No. 681.
  Newman limestone, Campbell, No. 80.
  Newport Neck shales, Shaler, Woodworth, and Foerste, No. 582.
  New Scotland beds, Clarke and Schuchert, No. 101.
  Niagara, Gilbert, No. 217.
  Niagara formation, Buckley, No. 73.
  Niagara group, Luther, No. 449.
  Niagaran, Clarke and Schuchert, No. 101.
  Nilkola formation, Peters and Brooks, No. 524.
  Niobrara formation, Darton, No. 139.
  Niobrara formation, Hills, No. 319.
  Niobrara group, Logan, No. 439.
  Normandy limestone, Campbell, No. 80.
  Nussbaum formation, Hills, No. 319.
  Oak Creek beds, Ward, No. 690.
  Oceanic series, Hill, No. 313.
  Ogallala formation, Darton, No. 139.
  Olive grit, Dale, No. 134.
  Oneida conglomerate, Clarke and Schuchert, No. 101.
  Oneida conglomerate, Luther, No. 449.
  Oneonta beds, Clarke and Schuchert, No. 101.
  Onondaga group, Luther, No. 449.
  Onondaga limestone, Clarke and Schuchert, No. 101.
  Ontarian, Winchell and Grant, No. 780.
  Ontaric, Clarke and Schuchert, No. 101.
  Orca series, Schrader, No. 570.
  Oriskanian, Clarke and Schuchert, No. 101.
  Oriskany beds, Clarke and Schuchert, No. 101.
  Oriskany sandstone, Luther, No. 449.
  Osceola till, Willis and Smith, No. 746.
  Oswegan, Clarke and Schuchert, No. 101.
  Otis limestone, Norton, No. 501.
  Otterdale sandstone, Shaler and Woodworth, No. 581.
  Panama formation, Hershey, No. 302.
  Parkville shale, Keyes, No. 378.
  Parma sandstone, Lane, No. 418.
  Pawtucket shales, Shaler, Woodworth, and Foerste, No. 582.
  Pennington shale, Campbell, No. 80.
  Peorian zone, Leverett, No. 431.

Geologic formations described—Continued.
Pictou freestones, Ami, No. 9.
Pierre clay, Darton, No. 139.
Pierre shale, Hills, No. 819.
Pine Creek conglomerate, Udden, Nos. 642, 647.
Pinto diorite, Weed, No. 702.
Platte shale, Keyes, No. 378.
Plattsburg limestone, Keyes, No. 378.
Plattsmouth limestone, Keyes, No. 378.
Pokegama quartzite, Grant, Nos. 235, 236, 247.
Pokegama quartzite, Winchell, Nos. 762, 763.
Pondville group, Shaler, Woodworth, and Foerste, No. 582.
Portage beds, Clarke and Schuchert, No. 101.
Portage group, Luther, No. 449.
Port Hudson, Harris and Veatch, No. 283.
Porous formation, Hill, No. 313.
Potomac formation, Ladd, No. 400.
Potosi rhyolite series, Cross, No. 128.
Potsdam sandstone, Buckley, No. 73.
Potsdamian, Clarke and Schuchert, No. 101.
Puckwunge conglomerate, Winchell, Nos. 757, 766.
Puget formation, Willis and Smith, No, 746.
Pulaski formation, Diller, No. 157.
Purgatory conglomerate, Shaler, Woodworth and Foerste, No. 582.
Quadrant formation, Weed, Nos. 701, 702.
Randville dolomite, Clements and Smyth, No. 105.
Red beds, Williston, No. 753.
Red Lake moraine, Todd, No. 629.
Richmond beds, Clarke and Schuchert, No. 101.
Richmond beds, Hill, No. 313.
Robinson diorite, Weed, No. 702.
Robinson quartzite, Tower and Smith, No. 632.
Rochester shale, Clarke and Schuchert, No. 101.
Rockcastle conglomerate lentil, Campbell, No. 80.
Rondout waterlime, Clarke and Schuchert, No. 101.
Rose Island arkose, Shaler, Woodworth and Foerste, No. 582.
Sachuest arkose, Shaler, Woodworth and Foerste, No. 582.
Saganaga granite, Grant, No. 241.
St. Louis conglomerate, Hubbard, No. 343.
St. Louis limestone, Beyer, No. 49.
St. Louis limestone, Macbride, No. 450.
St. Peters sandstone, Buckley, No. 73.
Salina beds, Clarke and Schuchert, No. 101.
Salina group, Luther, No. 449.
Sangamon zone, Leverett, No. 431.
San Juan formation, Cross, No. 128.
San Miguel formation, Cross, No. 128.
Savanna sandstone, Taff, No. 616.
Senecan, Clarke and Schuchert, No. 101.
Schoharie grit, Clarke and Schuchert, No. 101.
Shawangunk grit, Clarke and Schuchert, No. 101.
Shelbyville moraine, Leverett, No. 431.
Siamo slate, Van Hise, No. 669.
Signal Hill sandstone, Walcott, No. 681.
Siluric, Clarke and Schuchert, No. 101.

Geologic formations described—Continued.
Silveria ? formation, Leverett, No. 431.
Smalls Brook limestone, Ami, No. 9.
Smelt Brook shales, Ami, No. 9.
Smith River lake beds, Weed, No. 702.
Sockanosset sandstone, Shaler, Woodworth and Foerste, No. 582.
Sooke beds, Merriam, No. 481.
Spokane shales, Walcott, No. 681.
Stanford conglomerate, Weed, No. 701.
Steep Rock series, McInnes, No. 456.
Steilacoom gravels, Willis and Smith, No. 746.
Stockton group, Kümmel, No. 396.
Stonybrook quartzite, Hobbs, No. 320.
Stuntz conglomerate, Winchell, No. 767.
Sturgeon formation, Clements and Smyth, No. 105.
Sukonk beds, Shaler, Woodworth and Foerste, No. 582.
Sunrise series, Mendenhall, No. 475.
Superjacent series, Turner and Ransome, No. 639.
Sushitna slate series, Eldridge and Muldrow, No. 172.
Sweetland Creek beds, Udden, Nos. 642, 643.
Sylamore sandstone, Williams, No. 743.
Taconic, Clarke and Schuchert, No. 101.
Taconic, Winchell, Nos. 756, 760.
Taconyte, Winchell, No. 762.
Taconyte member, Grant, No. 236.
Tanana schists, Peters and Brooks, No. 524.
Tanana series, Mendenhall, No. 475.
Tenmile River beds, Shaler, Woodworth and Foerste, No. 582.
Thayer shale, Keyes, No. 378.
Thomson slates, Winchell, Nos. 757, 768.
Three Forks limestone, Hague, No. 268.
Thurman sandstone, Taff, No. 616.
Timpas formation, Hills, No. 819.
Tishomingo granite, Vaughan, No. 671.
Tiverton arkose, Shaler, Woodworth and Foerste, No. 582.
Torbay slate, Walcott, No. 681.
Toronto formation, Leverett, No. 431.
Traverse, Lane, No. 418.
Trenton, Whiteaves, No. 728.
Trenton limestone, Buckley, No. 73.
Trenton limestone, Clarke and Schuchert, No. 101.
Trenton limestone, Dale, No. 134.
Trinidad formation, Hills, No. 819.
Tuckahoe group, Shaler and Woodworth, No. 581.
Tully limestone, Clarke and Schuchert, No. 101.
Tully limestone, Luther, No. 449.
Turtle Lake moraine, Todd, No. 629.
Tyringham gneiss, Emerson, No. 176.
Ulsterian, Clarke and Schuchert, No. 101.
Unkar terrane, Walcott, No. 681.
Utica formation, Hershey, No. 304.
Utica shale, Clarke and Schuchert, No. 101.
Valdez series, Schrader, No. 570.
Valparaiso moraine, Leverett, No. 431.
Vashon drift, Willis and Smith, No. 746.
Veraguas formation, Hershey, No. 302.

Geologic formations described—Continued.
  Vicksburg, Harris and Veatch, No. 283.
  Vinita beds, Shaler and Woodworth, No. 581.
  Wabaunsee formation, Prosser, No. 535.
  Wamsutta group, Shaler, Woodworth and Foerste, No. 582.
  Wapsipinicon, Norton, No. 501.
  Washington gneiss, Emerson, No. 176.
  Waterlime beds, Luther, No. 449.
  Wauswaugoning quartzite, Winchell, No. 766.
  Wellesley formation, Peters and Brooks, No. 524.
  Wewe slate, Van Hise, No. 669.
  White beds, Dale, No. 134.
  White limestones, Hill, No. 313.
  White River formation, Matthew, No. 474.
  Wild Rice moraine, Todd, No. 629.
  Wisconsin drift, Bain, No. 21.
  Wisconsin drift, Beyer, No. 49.
  Wisconsin drift, Calvin, No. 78.
  Wisconsin drift, Leverett, No. 431.
  Wisconsin drift, Macbride, No. 450.
  Wolf porphyry, Weed, No. 701.
  Yallahs, Hill, No. 313.
  Yarmouth zone, Leverett, No. 431.
  Yarmouth, Norton, No. 501.
  Yellowstone formation, Weed, No. 702.
Geologic maps. (Includes geologic maps of the whole or any part of the States mentioned.)
  California, Anderson, No. 16.
  California, Turner and Ransome, No. 639.
  Canada, Chalmers, No. 88.
    New Brunswick, Matthew, No. 468.
    Nova Scotia, Faribault, No. 182.
    Ontario, Barlow, No. 32.
    Ontario, McInnes, No. 456.
    Quebec, Barlow, No. 32.
  Colorado, Cross, No. 128.
  Colorado, Hills, No. 319.
  Illinois, Leverett, No. 431.
  Indiana, Ashley, No. 17.
  Indiana, Leverett, No. 432.
  Indian Territory, Taff, No. 616.
  Iowa, Bain, No. 21.
  Iowa, Beyer, No. 49.
  Iowa, Macbride, No. 450.
  Iowa, Norton, No. 501.
  Iowa, Udden, No. 642.
  Jamaica, Hill, No. 313.
  Louisiana, Harris and Veatch, No. 283.
  Massachusetts, Crosby, No. 122.
  Massachusetts, Emerson, No. 176.
  Michigan, Clements and Smyth, No. 105.
  Michigan, Hubbard, No. 343.
  Michigan, Lane, Nos. 417, 418.
  Minnesota, Grant, Nos. 234, 235 to 244, 247.
  Minnesota, Todd, Nos. 626, 627, 628, 629.
  Minnesota, Upham, Nos. 648, 649.
  Minnesota, Winchell, Nos. 757, 759 to 770.
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- **Paleontology**—Continued.
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    - Notes on Grammatodon, Woods, No. 793.
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    - Origin of mammals, Osborn, No. 510.
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    - Cambrian faunas, Matthew, No. 468.
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    - Paleozoic terrane beneath the Cambrian, Matthew, No. 469.
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    - Fish tooth from Arisaig series, Whiteaves, No. 727.
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    - Invertebrates from McAlester coal field, Indian Territory, Girty, No. 222.
    - New cystocrinoidean species, Sardeson, No. 565.
    - Notes on a stromatoporoid, Lambe, No. 416.
    - Rocks of Trenton age, Whiteaves, No. 728.
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    - Devonian and Carboniferous faunas, Kindle, No. 383.
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    - Devonian deposit in Illinois, Weller, No. 714.
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    - Dipterus in American Devonian, Udden, No. 644.
    - Fauna of Devonian, Monroe and Teller, No. 490.
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- **Paleontology**—Continued.
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    - Naples fauna in western New York, Clarke, No. 96.
    - New species of Diplodus, Eastman, No. 167.
    - Paleontology of Eighteen Mile Creek, Grabau, No. 229.
    - Sweetland Creek beds, Udden, No. 643.
    - Unrecognized horizon in Ontario, Ami, No. 10.
  - *Carboniferous.*
    - Devonian and Carboniferous faunas, Kindle, No. 383.
    - Devonian and Carboniferous fossils from Yellowstone National Park, Girty, No. 223.
    - Fauna of Vermicular sandstone, Weller, No. 711.
    - Fossil Crustacea, Jones and Woodward, No. 366.
    - Fossil flora of Coal Measures of Missouri, White, No. 720.
    - Fossil plants from McAlester coal field, Indian Territory, White, No. 719.
    - Invertebrates from McAlester coal field, Indian Territory, Girty, No. 222.
    - New forms of Pseudomonotis, Beede, No. 43.
    - New fossils from Kansas Coal Measures, Beede, No. 44.
    - New pelecypods, Beede and Rogers, No. 46.
    - New species of Paleozoic crustacean, Ami, No. 13.
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    - Note on Carboniferous Entomostraca, Dawson, No. 152.
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    - Mesozoic fossils from Yellowstone National Park, Stanton, No. 603.
  - *Cretaceous.*
    - Cretaceous and Eocene corals from Jamaica, Vaughan, No. 672.
    - Cretaceous and Eocene faunas, Harris, No. 280.
    - Cretaceous formations of Black Hills, Ward, No. 690.
    - Cretaceous invertebrates of Kansas, Logan, No. 440.
    - Cretaceous plants from Hay Creek coal field, Wyoming, Fontaine, No. 188.
    - Cuttlefish from Cretaceous rocks, Whiteaves, No. 726.
    - Fossil insects in Cretaceous, Gould, No. 228.
    - Fossil turtle, Parmenter, No. 516.
    - Geologia de los Alrededores de Orizaba, Böse, No. 56.
    - Geology of Jamaica, Hill, No. 313.
    - Mentor beds, Jones, No. 365.
    - Mesozoic fossils from Yellowstone National Park, Stanton, No. 603.

- **Paleontology**—Continued.
  - *Cretaceous*—Continued.
    - New Cretaceous fishes, Stewart, No. 610.
    - New discovery concerning Uintacrinus, Springer, No. 598.
    - New fish from the Cretaceous, Stewart, Nos. 609, 612.
    - New genus of fish from Cretaceous, Williston, No. 748.
    - Reptilian remains from Cretaceous, Lambe, No. 415.
    - Species of Cycadeoidea, Ward, No. 691.
    - Unknown species of Saurocephalus, Hay, No. 293.
  - *Tertiary*.
    - Bridger Eocene carnivore, Marsh, No. 464.
    - Cretaceous and Eocene faunas, Harris, No. 280.
    - Cretaceous and Tertiary corals from Jamaica Vaughan, No. 672.
    - Fossil egg, Farrington, No. 183.
    - Fossil flora, Yellowstone National Park, Knowlton, No. 392.
    - Fossil plants from Louisiana, Hollick, No. 328.
    - Geology of Jamaica, Hill, No. 313.
    - Lignitic stage, Part II, Harris, No. 281.
    - New Pliocene Polygyra, Johnson, No. 361.
    - New snake from the Eocene, Lucas, No. 445.
    - New species of tortoises, Hay, No. 287.
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    - Selenodont Artiodactyls of the Uinta, Scott, No. 576.
    - Tertiary sea-urchins, Merriam, No. 480.
    - Tetracaulodon (Tetrabelodon) shephardii Cope, Wagner, No. 679.
    - The Milagulidæ, Riggs, No. 550.
  - *Pleistocene*.
    - Buried loess in Story County, Iowa, Beyer, No. 50.
    - Distribution of loess fossils, Shimek, No. 583.
    - Drift in South Dakota, Todd, No. 625.
    - Fossil diatomaceous deposit in Iowa, Myers, No. 495.
    - Note on an echinoderm, Dawson, No. 151.
    - Species of Actæon, Stearns, No. 604.
  - *Genera and species described*.
    - Abietites angusticarpus Fontaine, Fontaine, No. 188.
    - Acacia lamarensis n. sp., Knowlton, No. 392.
      - macrosperma n. sp., Knowlton, No. 392.
      - wardii n. sp., Knowlton, No. 392.
    - Acanthoclema Hall, Grabau, No. 229.
      - scutulatum Hall, Grabau, No. 229.
    - Acantholenus siniger Matt., Matthew, No. 468.
    - Acer vivarium n. sp., Knowlton, No. 392.
    - Aceratherium incisivum, Osborn, No. 511.
    - Acervularia gracilis Billings sp., Lambe, No. 414.
    - Acherontemys heckmani n. sp., Hay, No. 287.
    - Aclœodictya n. gen., Hall and Clarke, Nos. 275, 277.
      - (?) eccentrica Hall (sp.), Hall and Clarke, Nos. 275, 277.
      - marsipus n. sp., Hall and Clarke, Nos. 275, 277.

- **Paleontology**—Continued.
  - *Genera and species described*—Continued.
    - Acrogenia Hall, Grabau, No. 229.
      - prolifera Hall, Grabau, No. 229.
    - Acrotreta gemma Billings, Walcott, No. 682.
    - Actæon cossmanni Ald., Harris, No. 281.
      - idoneus Con., Harris, No. 281.
      - traski Stearns, Stearns, No. 604.
    - Actinodictya Hall, Hall and Clarke, Nos. 275, 276.
      - placenta Hall, Hall and Clarke, Nos. 275, 276.
    - Actinopteria Hall, Grabau, No. 229.
      - boydi Hall, Grabau, No. 229.
      - decussata Hall, Grabau, No. 229.
    - Actinosepia canadensis n. gen. et sp., Whiteaves, No. 726.
    - Actinostroma Nicholson sp., Girty, No. 223.
    - Adeorbis dalli n. sp., Harris, No. 281.
      - liniferus Ald., Harris, No. 281.
      - sylværupis n. sp., Harris, No. 281.
    - Aechimina Jones and Holl, Grabau, No. 229.
      - marginata Ulrich, Grabau, No. 229.
    - Aesopus erectus, Harris, No. 281.
    - Aglithodictya n. gen., Hall and Clarke, Nos. 275, 276.
      - numulina n. sp., Hall and Clarke, Nos. 275, 276.
    - Agnostus bidens Meek, Walcott, No. 682.
      - interstrictus White, Walcott, No. 682.
      - pisiformis Linn., Matthew, No. 468.
      - tumidosus Hall and Whitfield, Walcott, No. 682.
    - Agoniatites, Clarke, No. 98.
    - Alethopteris ambigua Lx., White, No. 720.
      - serlii (Brongn.) Goepp, White, Nos. 719, 720.
        - var. missouriensis n. var., White, No. 720.
    - Aloiopteris erosa (Gutb.), White, No. 720.
      - winslovii D. W., White, No. 719.
      - (Corynepteris?) winslovii n. sp., White, No. 720.
    - Alveolites Lamarck, Lambe, No. 413.
      - goldfussi Billings, Lambe, No. 413.
      - labechei Milne-Edwards and Haime, Lambe, No. 413.
      - niagarensis Rominger, Lambe, No. 413.
      - squamosa Billings, Lambe, No. 413.
      - vallorum Meek, Lambe, No. 413.
    - Ambocœlia Hall, Grabau, No. 229.
      - nana Grabau, Grabau, No. 229.
      - parva n. sp., Weller, No. 711.
      - præumbona Hall, Grabau, No. 229.
      - spinosa Clarke, Grabau, No. 229.
      - umbonata (Conrad), Grabau, No. 229.
        - var. nana, n. var., Grabau, Nos. 229, 230.
    - Amnicola ? cretacea n. sp., Stanton, No. 603.
    - Amplexus Sowerby, Grabau, No. 229.
      - hamiltoniæ Hall, Grabau, No. 229.
      - (?) intermittens Hall, Grabau, No. 229.
    - Ampullina recurva var., Harris, No. 281.
    - Anaptogonia Cope, Cope No. 118.
      - hiatidens Cope, Cope, No. 118.
    - Anarcestes plebeiformis Hall (sp.), Clarke, No. 98.

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Genera and species described—Continued.

- Anatina (Cercomya) punctata n. sp., Stanton, No. 608.
- Ancilla (Olivula) staminea Con., Harris, No. 281.
- Ancyrocrinus Hall, Grabau, No. 229.
  - bulbosus Hall, Grabau, No. 229.
- Andromeda delicatula Lx., Hollick, No. 328.
  - eolignitica n. sp., Hollick, No. 328.
- Anisotrypa sp., Girty, No. 223.
- Annularia sphenophylloides (Zenk.) Guth., var. intermedia Lx., White, No. 719.
  - stellata (Schloth.) Wood, White, Nos. 719, 720.
    - var. angustifolia Lx. ?, White, No. 720.
- Anogmius polymicrodus Stewart, Stewart, No. 611.
- Anomocare stenotides Matt., Matthew, No. 468.
- Aparchites (?) robustus n. sp., Matthew, No. 468.
- Aphlebia cf. filiciformis (Gutb.) Sterzel., White, No. 720.
  - germani Zeill., White, No. 720.
  - membranacea (Lx.), White, No. 720.
  - spinosa (Lx.), White, No. 720.
  - subgoldernbergii n. sp., White, No. 720.
  - sp. White, No. 720.
- Apocynophyllum sapindifolium n. sp., Hollick, No. 328.
- Aporrhais gracilis Ald., Harris, No. 281.
- Arachnophyllum diffluens Milne-Edwards and Haime sp., Lambe, No. 414.
  - eximium Billings sp., Lambe, No. 414.
- Aralia notata Lx., Knowlton, No. 392.
  - serrulata n. sp., Nnowlton, No. 392.
  - whitneyi Lx., Knowlton, No. 392.
  - wrightii n. sp., Knowlton, No. 392.
- Araucarioxylon hoppertonæ Knowlton n. sp., Ward, No. 690.
  - virginianum Kn., Knowlton, No. 391.
- Araucarites cuneatus Ward n. sp., Fontaine, No. 188.
  - wyomingensis n. sp., Fontaine, No. 188.
- Archimides sp., Girty, No. 223.
- Arctostaphylos elliptica n. sp., Knowlton, No. 392.
- Arionellus levis n. sp., Walcott, No. 682.
  - sp. undet., Walcott, No. 682.
- Artocarpus dubia n. sp., Hollick, No. 328.
  - lessigiana (Lx.) Kn., Hollick, No. 328.
  - pungens Lx., Hollick, No. 328.
  - quercoides n. sp., Knowlton, No. 392.
- Arystidictya n. gen., Hall and Clarke, Nos. 275, 276.
  - elegans n. sp., Hall and Clarke, Nos. 275, 276.
  - nodifera n. sp., Hall and Clarke, Nos. 275, 276.
- Aspidella terranovica Billings, Walcott, No. 681.
- Asplenium dicksonianum Heer ?, Fontaine, No. 188.
  - dicksonianum Herr, Ward, No. 690.
  - erosum ? (Lx.) Kn., Knowlton, No. 392.
  - haguei n. sp., Knowlton, No. 392.
  - iddingsi n. sp., Knowlton, No. 392.

Paleontology—Continued.

Genera and species described—Continued.

- Asplenium magnum n. sp., Knowlton, No. 392.
  - remotidens n. sp., Knowlton, No. 392.
- Astarte meeki n. sp., Stanton, No. 608.
  - smithvillensis Har., Harris, No. 280.
- Asterophyllites equisetiformis (Schloth.) Brongn., White, Nos. 719, 720.
  - longifolius (Stb.) Brongn., White, No. 720.
- Astrocœnia conica n. sp., Logan, No. 438.
- Astrodapsis tumidus Rémond, Merriam, No. 480.
  - whitneyi Rémond, Merriam, No. 480.
- Astyris subfraxa n. sp., Harris, No. 281.
- Athrotaxopsis tenuicaulis Fontaine, Fontaine, No. 188.
- Athyris McCoy, Grabau, No. 229.
  - incrassata Hall (?), Girty, No. 223.
  - lamellosa Léveillé, Girty, No. 223.
  - lamellosa (Léveillé), Weller, No. 711.
  - spiriferoides (Eaton), Grabau, No. 229.
  - vitatta var. triplicata n. var., Girty, No. 223.
  - (Cleiothyris?) sp., Weller, No. 711.
- Atrypa Dalman, Grabau, No. 229.
  - missouriensis Miller, Girty, No. 223.
  - reticularis Linné, Girty, No. 223.
  - reticularis (Linnæus), Grabau, No. 229
  - spinosa Hall, Grabau, No. 229.
- Atys robustoides Ald., Harris, No. 281.
- Aulopora Goldfuss, Grabau, No. 229.
  - geometrica n. sp., Girty, No. 223.
  - serpens Goldf., Grabau, No. 229.
  - tubæformis Goldf., Grabau, No. 229.
- Autodetus Lindström, Grabau, No. 229.
  - lindstroemi Clarke, Grabau, No. 229.
- Avellana bullata Mort., Harris, No. 280.
- Avicula (Oxytoma) wyomingensis n. sp., Stanton, No. 608.
- Aviculopecten McCoy, Grabau, No. 229.
  - exacutus Hall, Grabau, No. 229.
  - insignis Hall, Grabau, No. 229.
  - occidentalis (Shumard), Girty, No. 222.
  - princeps (Conrad), Grabau, No. 229.
- Bactrites Sandberger, Grabau, No. 229.
- Bactrites G. Sandberger, Clarke, No. 96.
  - aciculum Hall (sp.), Clarke, No. 96.
  - aciculum (Hall), Grabau, No. 229.
  - gracilior Clarke, Grabau, No. 229.
  - gracilior n. sp., Clarke, No. 96.
- Baculites anceps, Harris, No. 280.
- Baieropsis adiantifolia Fontaine, Fontaine, No. 188.
  - pluripartita Fontaine ?, Fontaine, No. 188.
- Bairdia McCoy, Grabau, No. 229.
  - leguminoides Ulrich, Grabau, No. 229.
- Barbatia cuculloides var., Harris, No. 280.
- Bathyuriscus Meek ?, Walcott, No. 682.
- Bellerophon Montfort, Grabau, No. 229.
- Bellerophon (sensu stricto), Girty, No. 222.
  - leda Hall, Grabau, No. 229.
  - patulus Hall, Grabau, No. 229.
- Bellinurus grandævus Jones & Woodw., Jones and Woodward, No. 366.
- Beloceras Hyatt, Clarke, No. 96.
  - iynx n. sp., Clarke, No. 96.
  - (?) napelesense n. sp., Clarke, No. 96.

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Genera and species described—Continued.
Beltina n. gen., Walcott, No. 681.
  danai n. sp., Walcott, No. 681.
Betula iddingsi n. sp., Knowlton, No. 392.
Beyrichia McCoy, Grabau, No. 229.
  hamiltonensis Jones, Grabau, No. 229.
  (?) primæva n. sp., Matthew, No. 468.
  tricollina Ulrich, Grabau, No. 229.
Billingsella coloradoensis Shumard, Walcott, No. 682.
Bison bison (Linnæus), Lucas, No. 444.
  alleni Marsh, Lucas, No. 444.
  antiquus Leidy, Lucas, No. 444.
  crassicornis Richardson, Lucas, No. 444.
  ferox Marsh, Lucas, No. 444.
  latifrons (Harlan), Lucas, No. 444.
  occidentalis Lucas, Lucas, Nos. 444, 446.
Blarina simplicidens Cope, Cope, No. 118.
Botryllopora Nicholson, Grabau, No. 229.
  socialis Nicholson, Grabau, No. 229.
Botryodictya n. gen., Hall and Clarke, Nos. 275, 276.
  ramosa (sp.), Hall and Clarke, Nos. 275, 276.
Brittsia n. gen., White, No. 720.
  problematica n. sp., White, No. 720.
Bucania ? sp., Weller, No. 711.
Bucanopsis, Girty, No. 222.
Buccinanops ellipticum Whitf., Harris, Nos. 280, 281.
Bullia buccinoides Merriam, Merriam, No. 481.
Bulliopsis choctavensis Ald., Harris, No. 281.
Bunomeryx Wortman, Scott, No. 576.
Cadulus abruptus Ald. and M., Harris, No. 281.
Calamites Suckow, White, No. 720.
  cannæformis Schloth., White, No. 719.
  cistii Brongn., White, No. 720.
  ramosis Artis, White, No. 720.
Calamodendron approximatum (Schloth.) Brongn., White, No. 719.
Calamostachys ovalis Lx. ?, White, No. 720.
Calapœcia Billings, Lambe, No. 413.
  canadensis Billings, Lambe, No. 413.
Calathospongia n. gen., Hall and Clarke, Nos. 275, 277.
  amphorina n. sp., Hall and Clarke, Nos. 275, 277.
  carceralis n. sp., Hall and Clarke, Nos. 275, 277.
  carlin, n. sp., Hall and Clarke, Nos. 275, 277.
  (?) magnifica, n. sp., Hall and Clarke, Nos. 275, 277.
  redfieldi Hall (sp.), Hall and Clarke, Nos. 275, 277.
  (?) sacculus Hall (sp.), Hall and Clarke, Nos. 275, 277.
  tiffanyi n. sp., Hall and Clarke, Nos. 275, 277.
Callipteridium inæquale Lx., White, Nos. 719, 720.
  mansfieldi Lx., White, No. 719.
  membranaceum Lx., White, No. 720.
  sullivantii (Lx.) Weiss, White, Nos. 719, 720.
Calyptræa aperta Sol., Harris, No. 281.
Calyptraphorus trinodiferus Con., Harris, No. 280.

Paleontology—Continued.
Genera and species described—Continued.
Camarophoria ringens Swallow, Girty, No. 223.
Camarotœchia Hall and Clarke, Grabau, No. 229.
  camarifera Winchell (?), Girty, No. 223.
  congregata (Conrad), Grabau, No. 229.
  dotis Hall, Grabau, No. 229.
  herrickana n. sp., Girty, No. 223.
  horsfordi Hall, Grabau, No. 229.
  metallica White, Girty, No. 223.
  sappho Hall, Grabau, No. 229.
  sappho Hall (?), Girty, No. 223.
  sp., Girty, No. 223.
Camelomeryx Scott, Scott, No. 576.
Campophyllum sp., Girty, No. 222.
Camptonectes burlingtonensis Gabb, Harris, No. 280.
  bellistriatus Meek, Stanton, No. 603.
    var. distans n. var., Stanton, No. 603.
  pertenuistriatus Hall and Whitfield, Stanton, No. 603.
  platessiformis White, Stanton, No. 603.
Cancellaria graciloides Ald., Harris, No. 281.
    var. bella n. var., Harris, No. 281.
  lanceolata Ald., Harris, No. 281.
  marieana, Harris, No. 281.
  quercollis var. greggi, Harris, Nos. 280, 281.
  sylværupis Har., Harris, No. 281.
  tortiplica Con., Harris, No. 281.
Canis priscolatrans Cope, Cope, No. 118.
Cannapora Hall, Lambe, No. 413.
  junciformis Hall, Lambe, No. 413.
Capulus expansus Whitf., Harris, No. 281.
  sp., Weller, No. 711.
Carbonia rankiniana, Dawson, No. 152.
Cardiocarpon (Samaropsis) branneri Fairch. and D. W., White, No. 720.
Cardiola Broderip, Grabau, No. 229.
  retrostriata von Buch, Grabau, No. 229.
Cardiopsis (?) erectus n. sp., Weller, No. 711.
  radiata Meek and Worthen, Weller, No. 711.
Cardium alabamense, Harris, No. 280.
  tuomeyi Ald., Harris, No. 280.
Cariacus lævicornus Cope, Cope, No. 118.
  sp. Cope, No. 118.
Caricella podagrina Dall., Harris, No. 281.
Carpites pedunculatus n. sp., Knowlton, No. 392.
Carpolithus barrensis Ward n. sp., Fontaine, No. 188.
  fasciculatus Fontaine, No. 188.
  fœnarius Ward., n. sp., Fontaine, No. 188.
  montium-nigrorum Ward, n. sp., Fontaine, No. 188.
  virginiensis Fontaine, Fontaine, No. 188.
Cassidaria brevidentata Ald. var., Harris, Nos. 280, 281.
  dubia Ald., Harris, No. 281.
Castanea pulchella n. sp., Knowlton, No. 392.
Castor fibre Linn, Cope, No. 118.
Celastrophyllum pulchrum n. sp., Ward, No. 690.

Paleontology—Continued.
Genera and species described—Continued.
Celastrus culveri n. sp., Knowlton, No. 392.
ellipticus n. sp., Knowlton, No. 392.
inæqualis n. sp., Knowlton, No. 392.
taurinensis Ward (?), Hollick, No. 328.
veatchi n. sp., Hollick, No. 328.
Centronella Billings, Grabau, No. 229.
impressa Hall, Grabau, No. 229.
Cephalotaxopis magnifolia Fontaine, Fontaine, No. 188.
Ceratodictya n. gen., Hall and Clarke, Nos. 275, 276.
annulata Hall (sp.), Hall and Clarke, Nos. 275, 276.
carpenteriana n. sp., Hall and Clarke, Nos. 275, 276.
centeta n. sp., Hall and Clarke, Nos. 275. 276.
cincta Hall (sp.), Hall and Clarke, Nos. 275, 276.
zonata n. sp., Hall and Clarke, Nos. 275, 276.
Ceratopora n. gen., Grabau, Nos. 229, 231.
dichotoma n. sp., Grabau, Nos. 229, 231.
distorta n. sp., Grabau, No. 231.
jacksoni n. sp., Grabau, Nos. 229. 231.
Ceriocrinus monticulatus n. sp., Beede, No. 44.
Cerithiopsis conica Ald., Harris, No. 281.
fluviatilis Ald., Harris, No. 281.
terebropsis n. sp., Harris, No. 281.
Cerithium delicatulum Ald., Harris, No. 281.
tombigbeense Ald., Harris, No. 281.
Chonetes Fischer de Waldheim, Grabau, No. 229.
coronatus (Conrad), Grabau, No. 229.
illinoisensis Worthen, Weller, No. 711.
lepidus Hall, Grabau, No. 229.
loganensis Hall and Whitfield, Girty, No. 223.
mesolobius Norwood and Pratten, Girty, No. 222.
mucronatus Hall, Grabau, No. 229.
ornatus Shumard, Girty, No. 223.
scitulus Hall, Grabau. No. 229.
setigerus (Hall), Grabau, No. 229.
vicinus (Castelnau), Grabau, No. 229.
Chonophyllum canadense Billings sp., Lambe, No. 414.
nymphale Billings, sp., Lambe, No. 414.
Chrysodomus engonata Heilp., Harris, No. 281.
striata Ald., Harris, No. 281.
Cinnamomum buchi Heer, Hollick, No. 328.
scheuchzeri Heer (?), Hollick, No. 328.
sezannense Wat., Hollick, No. 328.
spectabile Heer, Knowlton, No. 392.
Cissites ingens Lx., Ward, No. 690.
salisburiæfolius Lx., Ward, No. 590.
Cissus haguei n. sp., Knowlton, No. 392.
Cladocora jamaicensis n. sp., Vaughan, No. 672.
Cladodus claypolei, Hay, No. 286.
corriger, Hay, No. 286.
Cladophleris parva Fontaine ?, Fontaine, No. 188.
wyomingensis n. sp., Fontaine, No. 188.

Paleontology—Continued.
Genera and species described—Continued.
Cladopora Hall, Lambe, No. 413.
crassa Rominger, Lambe, No. 413.
cryptodens Billings (sp.), Lambe, No. 413.
fischeri Billings (sp.), Lambe, No. 413.
frondosa Nicholson (sp.), Lambe, No. 413.
labiosa Billings, Lambe, No. 413.
lichenoides Rominger, Lambe, No. 413.
multipora Hall, Lambe, No. 413.
roemeri Billings (sp.), Lambe, No. 413.
turgida Rominger, Lambe, No. 413.
sp., Girty, No. 223.
Clathrospongia Hall, Hall and Clarke, Nos. 275, 276.
abacus Hall, Hall and Clarke, Nos. 275, 277.
caprodonta n. sp., Hall and Clarke, Nos. 275, 277.
(?) desmia n. sp., Hall and Clarke, Nos. 275, 276.
fenestrata Hall (sp.), Hall and Clarke, Nos. 275, 276.
(?) hamiltonensis Hall (sp.), Hall and Clarke, Nos. 275, 276.
(?) irregularis Hall (sp.), Hall and Clarke, Nos. 275, 276.
(?) tomaculum Hall (sp.), Hall and Clarke, Nos. 275, 276.
vascellum Hall (sp.), Hall and Clarke, Nos. 275, 276.
Clavilithes kennedyanus Har., Harris, No. 281.
Clemmys insculpta Le Conte, Cope, No. 118.
percrassus Cope, Cope, No. 118.
Cleodictya Hall, Hall and Clarke, Nos. 275, 277.
claypolei n. sp., Hall and Clarke, Nos. 275, 277.
gloriosa Hall, Hall and Clarke, Nos. 275. 277.
mohri Hall, Hall and Clarke, Nos. 275, 277.
Clepsydrospongia matutina n. sp., Hall and Clarke, Nos. 275, 276.
Cliothyris crassicardinalis White, Girty, No. 223.
var. nana n. var., Girty, No. 223.
roissyi Walcott (non Léveillé), Girty, No. 223.
Clisiophyllum billingsi Dawson sp., Lambe, No. 414.
teres, n. sp., Girty, No. 223.
Clypeaster? brewerianus Rémond, Merriam. No. 480.
Cœnites Eichwald, Lambe, No. 413.
juniperina Eichwald, Lambe, No. 413.
lunata Nicholson and Hinde, Lambe, No. 413.
selwynii Nicholson (sp.), Lambe, No. 413.
Coleolus Hall, Grabau, No. 229.
(?) gracilis Hall, Grabau, No. 229.
tenuicinctum, Grabau, No. 229.
Columnaria rugosa Billings sp., Lambe, No. 414.
Conocardium Bronn, Grabau, No. 229.
crassifrons (Conrad), Grabau, No. 229.
eboraceum Hall, Grabau, No. 229.

Paleontology—Continued.
Genera and species described—Continued.
Conocardium—Continued.
normale Hall, Grabau, No. 229.
pulchellum White and Whitfield (?), Girty, No. 223.
Conomitra tracyi n. sp., Harris, No. 281.
Conostichus broadheadi Lx., White, No. 720.
prolifer Lx., White, No. 720.
Conularia Miller, Grabau, No. 229.
undulata Conrad, Grabau, No. 229.
Corbula alabamensis var., Harris, No. 280.
sp., Logan, No. 440.
Cordaites Unger, White, No. 720.
communis Lx., White, No. 720.
diversifolius Lx. ?, White, No. 720.
Cordianthus dichotomus Lx., White, No. 720.
ovatus Lx., White, No. 720.
Cornulina armigera, Harris, No. 281.
Cornulites Schlotheim, Grabau, No. 229.
hamiltoniæ n. sp., Grabau, No. 229.
Cornus newberryi Hollick, Knowlton, No. 392.
wrightii n. sp., Knowlton, No. 392.
studeri Heer (?), Hollick, No. 328.
Corylus macquarryi (Forbes) Heer, Knowlton, No. 392.
Crania Retzius, Grabau, No. 229.
crenistriata Hall, Grabau, No. 229.
lævis Keyes, Girty, No. 223.
Craniella Oehlert, Grabau, No. 229.
hamiltoniæ Hall, Grabau, No. 229.
Craspedophyllum Dybowsky, Grabau, No. 229.
archiaci Billings, Grabau, No. 229.
subcæspitosum (Nicholson), Grabau, No. 229.
Crassatella vadosa Mort., Harris, No. 280.
sp., Harris, No. 280.
Credneria ? pachyphylla n. sp., Knowlton, No. 392.
Crenipecten lævis n. sp., Weller, No. 711.
winchelli (Meek)?, Weller, No. 711.
Crepicephalus Owen, Walcott, No. 682.
texanus Shumard sp., Walcott, No. 682.
Cryphæus Green, Grabau, No. 229.
boothi Green, Grabau, No. 229.
var. calliteles Green, Grabau, No. 229.
Cryptocarya eolignitica n. sp., Hollick, No. 328.
Cryptodictya Hall, Hall and Clarke, Nos. 275, 276.
alleni Hall, Hall and Clarke, Nos. 275, 276.
Cryptonella Hall, Grabau, No. 229.
planirostris Hall, Grabau, No. 229.
rectirostris Hall, Grabau, No. 229.
Cryptozoon ? occidentale Dawson, Walcott, No. 681.
Chuaria circularis n. gen., et sp., Walcott, No. 681.
Ctenobolbina Ulrich, Grabau, No. 229.
minima Ulrich, Grabau, No. 229.
Cucullæa haguei Meek, Stanton, No. 603.
Cyathophyllum Goldfuss, Grabau, No. 229.
anticostiense Billings, Lambe, No. 414.
articulatum Wahlenberg, Lambe, No. 414.
cæspitosum Goldfuss (?), Girty, No. 223.
conatum Hall, Grabau, No. 229.
dawsoni n. sp., Lambe, No. 414.
spenceri n. sp., Lambe, No. 414.

Paleontology—Continued.
Genera and species described—Continued.
Cycadeoidea Buckland, Ward, No. 690.
aspera n. sp., Ward, Nos. 690, 691.
colei n. sp., Ward, Nos. 690, 691.
colossalis n. sp., Ward, Nos. 690, 691.
cicatricula n. sp., Ward, Nos. 690, 691.
dacotensis (McBride) Ward emend, Ward, Nos. 690, 691.
excelsa n. sp., Ward, Nos. 690, 691.
formosa n. sp., Ward, Nos. 690, 691.
furcata n. sp., Ward, Nos. 690, 691.
ingens n. sp., Ward, Nos. 690, 691.
ingens Ward, Wieland, Nos. 733, 734.
insolita n. sp., Ward, Nos. 690, 691.
jenneyana Ward, Ward, Nos. 690, 691.
marshiana n. sp., Ward, Nos. 690, 691.
mcbridei n. sp., Ward, Nos. 690, 691.
minnekahtensis n. sp., Ward, Nos. 690, 691.
nana n. sp., Ward, Nos. 690, 691.
occidentalis n. sp., Ward, Nos. 690, 691.
paynei n. sp., Ward, Nos. 690, 691.
pulcherrima n. sp., Ward, Nos. 690, 691.
stillwelli n. sp., Ward, Nos. 690, 691.
turrita n. sp., Ward, Nos. 690, 691.
wellsi n. sp., Ward, Nos. 690, 691.
wielandi n. sp., Ward, No. 690.
Cycadeosperum rotundatum Fontaine, Fontaine, No. 188.
Cyclocladia Lindley and Hutton, White, No. 720.
brittsii n. sp., White, No. 720.
Cyclostrema aldrichi n. sp., Harris, No. 281.
Cylichna aldrichi Lang., Harris, No. 281.
sylværupus n. sp., Harris, No. 281.
Cyllene bellana Har., Harris, No. 281.
Cyperacites giganteus n. sp., Knowlton, No. 392.
(?) sp., Knowlton, No. 392.
Cyperites sp., Hollick, No. 328.
Cyphaspis Burmeister, Grabau, No. 229.
ornata Hall, Grabau, No. 229.
Cypræa smithii Ald., Harris, No. 281.
Cypricardella Hall, Grabau, No. 229.
bellistriata (Conrad), Grabau, No. 229.
Cypricardia ? haguei n. sp., Stanton, No. 603.
Cypricardinia Hall ?, Grabau, No. 229.
indenta (Conrad), Grabau, No. 229.
Cyprina ? cinnabarensis n. sp., Stanton, No. 603.
(?) iddingsi n. sp., Stanton, No. 603.
Cyrtina Davidson, Grabau, No. 229.
hamiltonensis Hall, Grabau, No. 229.
var. recta Hall, Grabau, No. 229.
Cyrtoclymenia neapolitana Clarke, Clarke, No. 96.
Cystiphyllum Lonsdale, Grabau, No. 229.
aggregatum Billings, Lambe, No. 414.
americanum E. and H., Grabau, No. 229.
conifollis Hall, Grabau, No. 229.
niagarense Hall sp., Lambe, No. 414.
varians Hall, Grabau, No. 229.
vesiculosum Goldfuss sp., Lambe, No. 414.
Cytheria (?) newcombei, Merriam, No. 481.
vancouverensis, Merriam, No. 481.
Czekanowskia nervosa Heer, Fontaine, No. 188.
Dalmanella subcarinata Hall, Girty, No. 222.

Paleontology—Continued.
- *Genera and species described*—Continued.
  - Dalmanites pleuroptyx (Green), Girty, No. 222.
  - Daphnogene kanii (?) Heer, Hollick, No. 328.
  - Deinodon Leidy, Hay, No. 289.
  - Dendracis cantabridgiensis n. sp., Vaughan, No. 672.
  - Dentalium microstria Heilp., Harris, No. 281.
    - multannulatum Ald., Harris, No. 281.
    - thalloides Con., Harris, No. 281.
  - Derbya keokuk Hall (?), Girty, No. 223.
  - Devallia ? montana n. sp., Knowlton, No. 392.
  - Dicellomus Hall, Walcott, No. 682.
    - nanus M. and H. sp., Walcott, No. 682.
  - Dicranophyllum ? sp., White, No. 720.
  - Dictyopteris carrii (Lx.), White, No. 719.
    - gilkersonensis D. W., White, No. 719.
  - Dictyospongia n. gen., Hall and Clarke, Nos. 275, 276.
    - almondensis n. sp., Hall and Clarke, Nos. 275, 276.
    - (?) bacteria n. sp., Hall and Clarke, Nos. 275, 276.
    - charis n. sp., Hall and Clarke, Nos. 275, 276.
    - cylindrica Whitfield (sp.), Hall and Clarke, Nos. 275, 277.
    - eumorphia n. sp., Hall and Clarke, Nos. 275, 276.
    - haplea n. sp., Hall and Clarke, Nos. 275, 276.
    - lophura n. sp., Hall and Clarke, Nos. 275, 276.
    - (?) marcellia Clarke (sp.), Hall and Clarke, Nos. 275, 276.
    - morini Barrois (sp.), Hall and Clarke, Nos. 275, 276.
    - sceptrum Hall (sp.), Hall and Clarke, Nos. 275, 276.
    - siræa n. sp., Hall and Clarke, Nos. 275, 276.
    - (?) stylina n. sp., Hall and Clarke, Nos. 275, 277.
    - (Mastodictya) osculada n. sp., Hall and Clarke, Nos. 275, 277.
  - Dielasma King, Grabau, No. 229.
    - utah Hall and Whitfield, Girty, No. 223.
    - sp. ?, Weller, No. 711.
    - (Cranæna) romingeri Hall, Grabau, No. 229.
  - Diospyros haguei n. sp., Knowlton, No. 392.
    - lamarensis n. sp., Knowlton, No. 392.
  - Diphyphyllum cæspitosum Hall sp., Lambe, No. 414.
    - multicaule Hall sp., Lambe, No. 414.
    - simcoense Billings sp., Lambe, No. 414.
  - Diplodocus longus, Osborn, No. 509.
  - Diplodus politus Newberry, Eastman, No. 167.
    - priscus n. sp., Eastman, No. 167.
    - striatus n. sp., Eastman, No. 167.
  - Diploria Milne-Edwards and Haime, Vaughan, No. 672.
    - conferticostata n. sp., Vaughan, No. 672.
      - var. columnaria n. var., Vaughan, No. 672.

Paleontology—Continued.
- *Genera and species described*—Continued.
  - Dipterus calvini Eastman, Udden, No. 644.
    - contraversus, Hay, No. 286.
  - Discohelix verrili n. sp. (by Aldrich), Harris, No. 281.
  - Distyonema Hall, Grabau, No. 229.
  - Dombeyopsis platanoides Lx., Knowlton, No. 392.
  - Dorycrinus Roemer, Grabau, No. 229.
  - Dryophyllum longipetillatum n. sp., Knowlton, No. 392.
  - Dryopteris weedii n. sp., Knowlton, No. 392.
    - xantholithense n. sp., Knowlton, No. 392.
  - Dryptosaurus kenabekides, Hay, No. 289.
  - Duncanella fanningana (Safford), Girty, No. 222.
    - rudis Girty, Girty, No. 222.
  - Eccyliomphalus Portloch, Grabau, No. 229.
    - laxus (Hall), Grabau, No. 229.
  - Echinarachinius gibbsi Rémond, Merriam, No. 480.
    - excentricus Eschscholtz, Merriam, No. 480.
    - (?) ectenodictya Hall, Hall and Clarke, Nos. 275, 277.
    - implexa Hall, Hall and Clarke, Nos. 275, 277.
  - Edmondia burlingtonensis M. and W., Weller, No. 711.
    - missouriensis n. sp., Weller, No. 711.
    - ? reflexa Meek, Girty, No. 222.
    - subtruncata Meek ?, Girty, No. 222.
  - Elæodendron polymorpha Ward, Knowlton, No. 392.
  - Elymella Hall, Grabau, No. 229.
    - missouriensis Miller and Gurley, Weller, No. 711.
    - nuculloides Hall, Grabau, No. 229.
  - Empo lisbonensis n. sp., Stewart, No. 610.
  - Endothyra baileyi var. parva n. var., Girty, No. 223.
  - Entomis Jones, Grabau, No. 229.
    - rhomboidea Jones, Grabau, No. 229.
  - Equisetum canaliculatum n. sp., Knowlton, No. 392.
    - deciduum n. sp., Knowlton, No. 392.
    - haguei n. sp., Knowlton, No. 392.
    - lesquereuxii Kn. Knowlton, No. 392.
    - virginicum Fontaine, Fontaine, No. 188
  - Equus Linn, Cope, No. 118.
    - fraternus Leidy, Cope, No. 118.
    - phlegon, Hay, No. 289.
  - Eremopteris bolibata n. sp., White, No. 720.
    - missouriensis Lx., White, No. 720.
  - Eridopora (?) sp., Girty, No. 223.
  - Erisocrinus megalobrachus n. sp., Beede, No. 44.
  - Erithizon ? dorsatum Linn, Cope, No. 118.
  - Eryops Cope, Williston, No. 750.
  - Eulima exilis Gabb, Harris, No. 281.
    - (Subularia) cainei n. sp., Harris, No. 281.
  - Eulimella tenua Gabb, Harris, No. 281.
  - Eumetria verneuiliana Hall, Girty, No. 223.
  - Euomphalus n. sp., Girty, No. 222.

Paleontology—Continued.
- *Genera and species described*—Continued.
  - Eupachycrinus tuberculatus Meek and Worthen, Girty, No. 222.
    - sp., Girty, No. 222.
  - Euphemus, Girty, No. 222.
    - (?) sp., Weller, No. 711.
  - Euthria dubia Ald., Harris, No. 281.
  - Excipulites callipterides (Schimp.) Kidst., White, No. 720.
  - Exilia pergracilis Harris, No. 281.
  - Exogyra costata Say, Harris, No. 280.
  - Fagus undulata n. sp., Knowlton, No. 392.
  - Fasciolaria sp., Logan, No. 438.
  - Favosites Lamarck, Grabau, No. 229.
  - Favosites Lamarck, Lambe, No. 413.
    - alpenensis, Lambe, No. 413.
    - argus Hall, Grabau, No. 229.
    - aspera d'Orbigny, Lambe, No. 413.
    - basaltica Goldfuss (sp.), Lambe, No. 413.
    - billingsii Rominger, Lambe, No. 413.
    - canadensis Billings (sp.), Lambe, No. 413.
    - cervicornis Milne-Edwards and Haime, Lambe, No. 413.
    - clausa Rominger, Lambe, No. 413.
    - conicus Hall, Girty, No. 222.
    - digitata Rominger, Lambe, No. 413,
    - gaspensis n. sp., Lambe, No. 413.
    - gothlandica Lamarck, Lambe, No. 413.
    - hamiltoniæ Hall, Grabau, No. 229.
    - hemispherica Milne-Edwards and Haime, Lambe, No. 413.
    - hisingeri Milne-Edwards and Haime, Lambe, No. 413.
    - niagarensis Hall, Lambe, No. 413.
    - nitella Winchell, Lambe, No. 413.
    - radiciformis Rominger, Lambe, No. 413
    - turbinata Billings, Lambe, No. 413.
    - sp., Girty, No. 223.
  - Feistmantelia oblonga Ward, n. sp., Fontaine, No. 188.
  - Felis eyra Desm., Cope, No. 118.
  - Fenestella Lonsdale, Girty, No. 223.
  - Fenestella Miller, Grabau, No. 229.
    - emaciata Hall, Grabau, No. 229.
    - planiramosa Hall, Grabau, No. 229.
  - Ficophyllum serratum Fontaine, Fontaine, No. 188.
  - Ficus artocarpoides ? Lx., Hollick, No. 328.
    - deformata n. sp., Knowlton, No. 392.
    - densifolia n. sp., Knowlton, No. 392.
    - haguei n. sp., Knowlton, No. 392.
    - harrisiana n. sp., Hollick, No. 328.
    - planicostata Lx., Hollick, No. 328.
    - ungeri Lx., Knowlton, No. 392.
    - sp., Knowlton, No. 392.
  - Fissurella alabama n. sp., Harris, No. 281.
  - Fistulicella Simpson, Grabau, No. 229.
    - plana Hall, Grabau, No. 229.
  - Fistuliporina Simpson, Grabau, No. 229.
    - digitata (Hall), Grabau, No. 229.
    - micropora (Hall), Grabau, No. 229.
    - minuta (Rominger), Grabau, No. 229.
    - scrobitulata (Hall), Grabau, No. 229.
    - segregata (Hall), Grabau, No. 229.

Paleontology—Continued.
- *Genera and species described*—Continued.
  - Fletcheria Milne-Edwards and Haime, Lambe, No. 413.
    - incerta Billings (sp.), Lambe, No. 413.
  - Fraxinus denticulata Heer, Knowlton, No. 392.
    - johnstrupi (?) Heer, Hollick, No. 328.
    - wrightii n. sp., Knowlton, No. 392.
  - Fulguroficus triserialis Whitf., Harris, No. 281.
  - Fusoficula juvenis Whitf., Harris, Nos. 280, 281.
  - Fusulina cylindrica, Smith, No. 592.
  - Fusus bellanus Har., Harris, No. 281.
    - harrisi Ald., Harris, No. 280.
    - interstriatus Heilp., Harris, No. 281.
    - ottonis Ald., Harris, No. 281.
    - rugatus Ald., Harris, No. 281.
    - subtenuis Heilp., Harris, No. 281.
    - sp., Logan, No. 438.
    - (Buccinofusus) harrisi Ald., Harris, No. 281.
  - Geinitzia jenneyi n. sp., Fontaine, No. 188.
  - Gennæocrinus W. and S., Grabau, No. 229.
    - eucharis (Hall), Grabau, No. 229.
    - nyssa (Hall), Grabau, No. 229.
  - Gephyroceras Hyatt, Clarke, No. 96.
    - perlatum Hall (sp.), Clarke, No. 96.
    - (?) (Probeloceras?) gunendewa n. sp., Clarke, No. 96.
  - Glauconome Goldfuss, Grabau, No. 229.
    - carinata Hall, Grabau, No. 229.
  - Gleichenia zippei (Corda) Heer?, Fontaine, No. 188.
  - Glossozamites fontaineanus Ward n. sp., Fontaine, No. 188.
  - Glyptostrobus brookensis (Fontaine) Ward, Fontaine, No. 188.
  - Gomphoceras Sowerby, Grabau, No. 229.
    - lunatum Hall, Grabau, No. 229.
    - manes Hall, Grabau, No. 229.
  - Gongylospongia n. gen., Hall and Clarke, No. 275, 276.
    - complanatus Hall, Grabau, No. 229.
    - marshi n. sp., Hall and Clarke, Nos. 275, 276.
    - rhynchostoma Clarke, Grabau, No. 229.
    - sororium Clarke, Grabau, No. 229.
  - Goniatites de Haan, Grabau, No. 229.
    - (Gephyroceras) holzapfeli Clarke, Grabau, No. 229.
    - (Manticoceras) intumescens Beyrich, Grabau, No. 229.
    - (Probeloceras) lutheri Grabau, No. 229.
    - (Tornoceras) bicostatus Hall, Grabau, No. 229.
      - uniangularis Conrad, Grabau, No. 229.
  - Goniobasis? (?) increbescens n. sp., Stanton, No. 603.
    - pealei n. sp., Stanton, No. 603.
  - Goniophora Phillips, Grabau, No. 229.
    - modiomorphoides n. sp., Grabau, Nos. 229, 230.
  - Gosselettia Barrios, Grabau, No. 229.
    - retusa Hall, Grabau, No. 229.
  - Grammatodon M. and H., Woods, No. 793.
  - Grammysia de Verneuil, Grabau, No. 229.
    - arcuata (Conrad), Grabau, No. 229.

Paleontology—Continued.
Genera and species described—Continued.
Grewiopsis ? aldersoni n. sp., Knowlton, No. 392.
Griphodictya n. gen., Hall and Clarke, Nos. 275, 277.
    eliphanes n. sp., Hall and Clarke, Nos. 275, 277.
Gryphæa galceola var. nebrascensis Meek and Hayden, Stanton, No. 603.
    planoconvexa Whitfield, Stanton, No. 603.
    vesicularis Lam., Harris, No. 280.
Grypodon, Hay, No. 286.
Gulo liscus Linn, Cope, No. 118.
Habrocrinus d'Orb., Grabau, No. 229.
    pentadactylus n. sp., Grabau, No. 229.
Hadrianus schucherti n. sp., Hay, No. 287.
Hadrophyllum, E. and H., Grabau, No. 229.
    woodi n. sp., Grabau, No. 229.
Haguia n. gen., Walcott, No. 682.
    sphærica n. sp., Walcott, No. 682.
Hallodictya n. gen., Hall and Clarke, Nos. 275, 276.
    cottoniana n. sp., Hall and Clarke, Nos. 275, 276.
    sciensis n. sp., Hall and Clarke, Nos. 275, 276.
Halysites Fischer, Lambe, No. 413.
    catenularia L., Lambe, No. 413.
        var. amplitubulata n. var., Lambe, No. 413.
        var. gracilis Hall, Lambe, No. 413.
        var. nitida n. var., Lambe, No. 413.
        var. quebecensis n. var., Lambe, No. 413.
        var. simplex n. var., Lambe, No. 413.
    compacta Rominger, Lambe, No. 413.
    micropora Whitfield, Lambe, No. 413.
Hederella Hall, Grabau, No. 229.
    canadensis (Nicholson), Grabau, No. 229.
    filiformis (Billings), Grabau, No. 229.
Helicodictya n. gen., Hall and Clarke, Nos. 275, 276.
    (?) concordia n. sp., Hall and Clarke, Nos. 275, 276.
    (?) scio n. sp., Hall and Clarke, Nos. 275, 276.
    trypania n. sp., Hall and Clarke, Nos. 275, 276.
Heliolites Dana, Lambe, No. 413.
    inordinata Lonsdale (sp.), Lambe, No. 413.
    interstincta L., Lambe, No. 413.
    subtubulata McCoy (sp.), Lambe, No. 413.
Heliophyllum Hall, Grabau, No. 229.
    confluens Hall, Grabau, No. 229.
    halli, E. and H. Grabau, No. 229.
Helminthoidichnites meeki n. sp., Walcott, No. 681.
    (?) neihartensis n. sp., Walcott, No. 681.
    (?) spiralis n. sp., Walcott, No. 681.
Helodus wortheni, Hay, No. 286.
Heteroceras sp., Harris, No. 280.
Hicoria crescentia n. sp., Knowlton, No. 392.
    culveri n. sp., Knowlton, No. 392.
Hindia sphæroidalis Duncan, Girty, No. 222.

Paleontology—Continued.
Genera and species described—Continued.
Hipponyx sylværupis n. sp., Harris, No. 281.
Holasterella wrighti var. americana n. var., Girty, No. 223.
Homalonotus Kœnig, Grabau, No. 229.
    dekayi (Green), Grabau, No. 229.
Homomya gallatinensis n. sp., Stanton, No. 603.
Hybodus copei, Hay, No. 286.
Hydnoceras Conrad, Hall and Clarke, Nos. 275, 276.
    anthracis n. sp., Hall and Clarke, Nos. 275, 276.
    avoca n. sp., Hall and Clarke, Nos. 275, 276.
    barroisi nom. nov., Hall and Clarke, Nos. 275, 276.
    bathense n. sp., Hall and Clarke, Nos. 275, 276.
    botrœdema n. sp., Hall and Clarke, Nos. 275, 276.
    eumeces n. sp., Hall and Clarke, Nos. 275, 276.
    eutheles n. sp., Hall and Clarke, Nos. 275, 276.
    gracile n. sp., Hall and Clarke, Nos. 275, 276.
    hyastrum n. sp., Hall and Clarke, Nos. 275, 276.
    jeumontense n. sp., Hall and Clarke, Nos. 275, 276.
    legatum, Hall and Clarke, Nos. 275, 276.
    lutheri n. sp., Hall and Clarke, Nos. 275, 276.
    multinodosum n. sp., Hall and Clarke, Nos. 275, 276.
    nodosum Hall (sp.), Hall and Clarke, Nos. 275, 276.
    phymatodes n. sp., Hall and Clarke, Nos. 275, 276.
    rhopalum n. sp., Hall and Clarke, Nos. 275, 276.
    tuberosum Conrad, Hall and Clarke, Nos. 275, 276.
        var. glossema n. var., Hall and Clarke, Nos. 275, 276.
    variabile n. sp., Hall and Clarke, Nos. 275, 276.
Hydriodictya n. gen., Hall and Clarke, Nos. 275, 276.
    cylix n. sp., Hall and Clarke, Nos. 275, 276.
    nephelia n. sp., Hall and Clarke, Nos. 275, 276.
    patula Hall, Hall and Clarke, Nos. 275, 276.
Hyolithes primordialis Hall, Walcott, No. 682.
Hyomeryx Marsh, Scott, No. 576.
Hypertragulus Cope, Scott, No. 576.
Hyphantænia Vanuxem (emendata), Hall and Clarke, Nos. 275, 276.
    chemungensis Vanuxem, Hall and Clarke, Nos. 275, 276.
Hysterites cordaitis Gr. 'Ey., White, No. 720.
Icanodus ? limitaris, Hay, No. 286.
Ilex ? affinis (?) Lx., Hollick, No. 828.
    sp., Hollick, No. 828.

Paleontology—Continued.

- *Genera and species described*—Continued.
  - Inoceramus acuteplicatus n. sp., Stanton, No. 608.
    - barabini Mort., Harris, No. 280.
  - Iphidea sculptis Meek, Walcott, No. 682.
    - sp. undet., Walcott, No. 682.
  - Isochilina Jones, Grabau, No. 229.
    - fabacea Jones, Grabau, No. 229.
  - Isopholis, Hay, No. 286.
  - Juglans crescentia n. sp., Knowlton, No. 392.
    - laurifolia n. sp., Knowlton, No. 392.
    - rugosa Lx., Hollick, No. 328.
    - schimperi Lx., Hollick, No. 328.
  - Kellia prima Ald., Harris, No. 280.
  - Labechua huronensis Billings sp., Lambe, No. 416.
  - Lælaps incrassatus, Hay, No. 289.
  - Lagomys palatinus Cope, Cope, No. 118.
  - Lapparia dumosa Con. var., Harris, No. 281.
  - Latirus tortilis var. nanafalius n. var., Harris, No. 281.
  - Laurinoxylon pulchrum n. sp., Knowlton, No. 392.
  - Laurus grandis Lx., Knowlton, No. 392.
    - montana n. sp., Knowlton, No. 392.
    - perdita n. sp., Knowlton, No. 392.
    - princeps Heer., Knowlton, No. 392.
    - primigenia Ung., Hollick, No. 328.
    - primigenia? Ung., Knowlton, No. 392.
    - pseudo-carolinensis Lx., Knowlton, No. 392.
  - Laxispira imbricalis, Harris, No. 280.
  - Lebedictya n. gen., Hall and Clarke, Nos. 275, 277.
    - crinita n. sp., Hall and Clarke, Nos. 275, 277.
  - Leda aldrichiana Har. var., Harris, No. 280.
    - corpulentoides Ald. var., Harris, No. 280.
  - Legumen planulatum Con., Harris, No. 280.
  - Leguminosites lamarensis n. sp., Knowlton, No. 392.
    - lesquereuxiana Kn., Knowlton, No. 392.
  - Leiopteria Hall, Grabau, No. 229.
    - conradi Hall, Grabau, No. 229.
    - rafinesquii Hall, Grabau, No. 229.
  - Leiorhynchus Hall, Grabau, No. 229.
    - dubium Hall, Grabau, No. 229.
    - limitare (Vanuxem), Grabau, No. 229.
    - multicostus Hall, Grabau, No. 229.
    - quadricostatum (Vanuxem), Grabau, No. 229.
  - Leiostoma (?) ludoviciana n. sp., Harris, No. 280.
  - Leperditia Ronault, Grabau, No. 229.
    - hudsonica Hall, Grabau, No. 229.
  - Lepidocystis vesicularis Lx., White, No. 719.
  - Lepidodendron Sternberg, White, No. 720.
    - brittsii Lx., White, No. 720.
    - choctavense n. sp., White, No. 719.
    - clypeatum Lx., White, No. 720.
    - lanceolatum Lx., White, No. 720.
    - modulatum Lx., White, No. 719.
    - rimosum var. recorticatum n. var., White, No. 720.
    - scutatum Lx., White, No. 720.

Paleontology—Continued.

- *Genera and species described*—Continued.
  - Lepidophloios Sternberg, White, No. 720
    - van ingeni n. sp., White, No. 720.
    - (?) cf. van ingeni, White, No. 720.
  - Lepidophyllum brevifolium Lx., White, No. 719.
    - jenneyi n. sp., White, No. 720.
    - lanceolatum L. and H., White, No. 719.
    - cf. mansfieldi Lx., White, No. 719.
    - missouriense n. sp., White, No. 720.
    - truncatum Lx., White, No. 719.
  - Lepidostrobus princeps Lx., White, No. 720.
  - Lepidoxylon anomalum Lx., White, No. 720.
  - Leptæna rhomboidalis Wilkens, Girty, Nos. 222, 223.
  - Leptecodon rectus n. gen. et sp., Williston, No. 748.
  - Leptichthys n. gen., Stewart, No. 612.
    - agilis n. sp., Stewart, No. 612.
  - Leptomeryx Leidy, Scott, No. 576.
  - Leptophyllia agassizi n. sp., Vaughan, No. 672.
  - Leptoreodon Wortman, Scott, No. 576.
  - Leptostrobus (?) alatus Ward n. sp., Fontaine, No. 188.
    - longifolius Fontaine, Fontaine, No. 188.
  - Leptotragulus Scott and Osborn, Scott, No. 576.
  - Lepus sylvaticus Bachm., Cope, No. 118.
  - Levibuccinum lineatum Con., Harris, No. 281.
  - Levifusus indentus n. sp., Harris, Nos. 280, 281.
    - pagoda Heilp., Harris, Nos. 280, 281.
    - supraplanus n. sp., Harris, Nos. 280, 281.
    - trabeatus Con., Harris, No. 281.
    - trabeatus Con. var.?, Harris, No. 280.
  - Lichenalia Hall, Grabau, No. 229.
    - stellata Hall, Grabau, No. 229.
  - Lichenaria typa W. and S., Sardeson, No. 567.
  - Lima pelagica Mort., Harris, No. 280.
  - Limnocyon riparius, Marsh, No. 464.
  - Linearia metastriata, Harris, No. 280.
  - Lingula Bruguière, Grabau, No. 229.
    - delia Hall, Grabau, No. 229.
    - mytiloides Sowerby?, Girty, No. 222.
    - spatulata Vanuxem, Grabau, No. 229.
    - (Glossina) leana Hall, Grabau, No. 229.
  - Lingulella subgenus of Obolus, Walcott, No. 683.
  - Linopteris gilkersonensis n. sp., White, No. 720.
  - Liorhynchus haguei n. sp., Girty, No. 223.
  - Liostracus parvus n. sp., Walcott, No. 682.
  - Liotia granulata Lea, Harris, No. 281.
  - Lithostrotion macounii n. sp., Lambe, No. 414.
    - sp., Girty, No. 223.
  - Litsea cuneata n. sp., Knowlton, No. 392.
  - Loculipora Hall, Grabau, No. 229.
    - perforata Hall, Grabau, No. 229.
  - Lonsdaleia pictoense Billings sp., Lambe, No. 414.
  - Loxonema Phillips, Grabau, No. 229.
    - attenuatum Hall ?, Girty, No. 222.
    - breviculum Hall, Grabau, No. 229.
    - ? coapta Hall, Grabau, No. 229.
    - delicatum n. sp., Girty, No. 223.
    - delphicola Hall, Grabau, No. 229.
    - hamiltoniæ Hall, Grabau, No. 229.

Paleontology—Continued.
  Genera and species described—Continued.
    Loxonema—Continued.
      (?) sp., Girty, No. 223.
      sp., Weller, No. 711.
    Lucina ozarkana Har., Harris, No. 280.
    Lunulicardium Munster, Grabau, No. 229.
      curtum Hall, Grabau, No. 229.
      fragile Hall, Grabau, No. 229.
    Lutra rhoadsii Cope, Cope, No. 118.
    Lyellia Milne-Edwards and Haime, Lambe, No. 413.
      affinis Billings, Lambe, No. 413.
      americana Milne-Edwards and Haime, Lambe, No. 413.
      decipiens Rominger, Lambe, No. 413.
      exigua Billings (sp.), Lambe, No. 413.
      superba Billings, Lambe, No. 413.
    Lygodium kaulfusii Heer, Knowlton, No. 392.
    Lynx calcaratus Cope, Cope, No. 118.
    Lyopora Nich. and Eth. jun., Lambe, No. 413.
      goldfussi Billings (sp.), Lambe, No. 413.
    Lyrodictya Hall, Hall and Clarke, Nos. 275, 277.
      (?) burlingtonensis Hall (sp.), Hall and Clarke, Nos. 275, 277.
      romingeri Hall, Hall and Clarke, Nos. 275, 277.
    Lysactinella Girty, Hall and Clarke, Nos. 275, 276.
    Machærodus Kaupp, Cope, No. 118.
      gracilis Cope, Cope, No. 118.
    Macrodon Lycett, Grabau, No 229.
    Macrodon Lycett, Woods, No. 793.
      hamiltoniæ Hall, Grabau, No. 229.
      sp., Weller, No. 711.
    Macron philadelphicus n. sp., Harris, No. 281.
    Mactra bistriata Har., Harris, No. 280.
    Magnolia culveri n. sp. Knowlton, No. 392.
      hilgardiana Lx., Hollick, No. 328.
      lanceolata Lx., Hollick, No. 328.
      microphylla n. sp., Knowlton, No. 392.
      (?) pollardi n. sp., Knowlton, No. 392.
      spectabilis n. sp., Knowlton, No. 392.
    Malapoenna lamarensis n. sp., Knowlton, No. 392.
    Mantioceras accelerans n. sp., Clarke, No. 96.
      apprimatum n. sp., Clarke, No. 96.
      contractum n. sp., Clarke, No. 96.
      fasciculatum n. sp., Clarke, No. 96.
      nodifer Clarke, Clarke, No. 96.
      oxy n. sp., Clarke, No. 96.
      pattersoni Hall (sp.), Clarke, No. 96.
        var. styliophilum, n. var., Clarke, No. 96.
      rhynchostoma n. sp., Clarke, No. 96.
      simulator Hall (sp.), Clarke, No. 96.
      sororium n. sp., Clarke, No. 96.
      tardum n. sp., Clarke, No. 96.
      vagans n. sp., Clarke, No. 96.
    Mariopteris capitata n. sp., White, No. 719.
      muricata (Schloth) Zeill., White, No. 719.
      cf. nervosa (Brongn.) Zeill., White, No. 720.
      occidentalis n. sp., White, No. 719.
        villosa n. var., White, No. 719.
      sillimanni (Brongn.), White, No, 719.
      sphenopteroides (Lx.) Zeill., White, No. 720.
      sp., White, No. 720.
      n. sp., ? White, No. 720.
    Martinia rostrata n. sp., Girty, No. 223.
    Mastodon americanus Leidy, Cope, No. 118.
    Mathilda leana Ald., Harris, No. 281.
    Matonidium althausii (Dunker) Ward n. comb., Fontaine, No. 188.
    Mazzalina plena Ald., Harris, No. 280.
      var. plenus, Harris, No. 281.
    Megalichthys, Hay, No. 286.
    Megalonyx loxodon Cope, Cope, No. 118.
      scalper Cope, Cope, No. 118.
      tortulus Cope, Cope, No. 118.
      wheatleyi Cope, Cope, No. 118.
    Megambonia lata Hall, Girty, No. 222.
    Melania sylværupis n. sp., Harris, No. 281.
      trigemmata Con., Harris, No. 281.
    Melanopsis anita Ald., Harris, No. 281.
      planoidea Ald., Harris, No. 281.
    Menophyllum (?) excavatum n. sp., Girty, No. 223.
    Mephitis Linn., Cope, No. 118.
      fossidens Cope, Cope, No. 118.
      leptops Cope, Cope, No. 118.
      obtusatus Cope, Cope, No. 118.
      orthostichus Cope, Cope, No. 118.
    Meristella Hall, Grabau, No. 229.
      arcuata var. atoka n. var., Girty, No. 222.
      barrisi Hall, Grabau, No. 229.
      haskinsi Hall, Grabau, No. 229.
      rostrata Hall, Grabau, No. 229.
    Mesalia pumila var. alabamensis Whitf., Harris, No. 281.
    Mesogaulus ballensis n. gen et sp., Riggs, No. 550.
    Mesomorpha catadupensis n. sp., Vaughan, No. 672.
    Matadoxides magnificus n. sp., Matthew, No. 470.
    Metula sylværupis n. sp., Harris, No. 281.
    Michelinia de Koninck, Lambe, No. 413.
      clappii Milne-Edwards and Haime, Lambe, No. 413.
      convexa d'Orbigny, Lambe, No. 413.
      favosistoidea Billings em. (favosoidea), Lambe, No. 413.
      placenta White, Girty, No. 223.
    Micmacca van ingeni Matt., Matthew, No. 468.
    Microtus dideltus Cope, Cope, No. 118.
      diluvianus Cope, Cope, No. 118.
      involutus Cope, Cope, No. 118.
      speothen Cope, Cope, No. 118.
    Mitra hatchetigbeensis Ald., Harris, No. 281.
      pergracilis Con., Harris, No. 281.
    Mitrella alabamensis Ald. and M., Harris, No. 281.
      mississippiensis Ald., Harris, No. 281.
    Modiella Hall, Grabau, No. 229.
    Modiola alabamensis Ald., Harris, No. 280.
      pygmæa (Conrad), Grabau, No. 229.
      stubbsi n. sp., Harris, No. 280.
      sp., Logan, No. 440.

Paleontology—Continued.
Genera and species described—Continued.
Modiomorpha Hall, Grabau, No. 229.
alata (Conrad), Grabau, No. 229.
concentrica (Conrad), Grabau, No. 229.
northviewensis n. sp., Weller, No. 711.
subalata (Conrad), Grabau, No. 229.
Monilopora Nich. and Eth. jr., Grabau, No. 231.
antiqua Whiteaves, Grabau, No. 231.
beecheri n. sp., Grabau, No. 231.
crassa (McCoy), Grabau, No. 231.
Moniloporidæ n. fam, Grabau, No. 341.
Monopteria ? subalata n. sp., Beede and Rogers, No. 46.
Monotrypa Nicholson, Grabau, No. 229.
amplectens n. sp., Grabau, No. 229.
fructicosa (Hall), Grabau, No. 229.
(?) furcata (Hall), Grabau, No. 229.
Moorea Jones and Kirby, Grabau, No. 229.
bicornuta Ulrich, Grabau, No. 229.
Mourlonia northviewensis n. sp., Weller, No. 711.
Multicolumnastræa n. gen., Vaughan, No. 672.
cyathiformis (Duncan), Vaughan, No. 672.
Murchisonia marcouiana Geinitz, Girty, No. 222.
Muricidea imbricatula, Harris, No. 281.
Musophyllum complicatum Lx., Knowlton, No. 392.
Mustela diluviana Cope, Cope, No. 118.
Myalina ? exasperata n. sp., Beede, No. 44.
Myliobatis leidyi, Hay, No. 286.
Mylodon ? harlanji Owen, Cope, No. 118.
Mylohyus Cope, Cope, No. 118.
nasutus Leidy, Cope, No. 118.
pennsylvanicus Leidy, Cope, No. 118.
tetragonus Cope, Cope, No. 118.
Myrica bolanderi ? Lx., Knowlton, No. 392.
lamarensis n. sp., Knowlton, No. 392.
wardii n. sp., Knowlton, No. 392.
Nageiopsis angustifolia Fontaine ?, Fontaine, No. 188.
longifolia Fontaine, Fontaine, No. 188.
Nassa cancellata Lea, Harris, No. 281.
exilis Con., Harris, No. 280.
newcombei Merriam, Merriam, No. 481.
Natica alabamiensis, Harris, No. 280.
aperta Whitf., Harris, Nos. 280, 281.
eminula Har., Harris, No. 280.
eminula Har. var., Harris, No. 281.
magno-umbilicata Lea, Harris, No. 281.
(Neverita) onusta Whitf., Harris, No. 281.
(Lacunaria) alabamiensis Whitf., Harris, No. 281.
erecta Whitf., Harris, No. 281.
semilunata, Harris, No. 281.
(Sigaticus) clarkeana Ald., Harris, No. 281.
Naticopsis (?) sp., Girty, No. 223.
Nautilus Breynius, Grabau, No. 229.
magister Hall, Grabau, No. 229.
(Centroceras) marcellensis (Vanuxem), Grabau, No. 229.
Neithea quinquecostata ? (Sow.) Mort., Harris, No. 280.
Neritina wyomingensis n. sp., Stanton, No. 603.

Paleontology—Continued.
Genera and species described—Continued.
Neuropteris Brongniart, 1822, White, No. 720.
caudata D. W., White, No. 719.
dilatata (L. and H.) Lx., White, No. 720.
griffithii Lx., White, No. 719.
harrisi n. sp., White, No. 719.
jenneyi D. W., White, No. 719.
missouriensis Lx., White, Nos. 719, 720.
var. nervosa n. var., White, No. 719.
scheuchzeri Hoffm., White, Nos. 719, 720.
Niso umbilicata Lea, Harris, No. 281.
Nucleospira Hall, Grabau, No. 229.
concinna Hall, Grabau, No. 229.
Nucula Lamarck, Grabau, No. 229.
corbuliformis Hall, Grabau, No. 229.
pulchella n. sp., Beede and Rogers, No. 46.
Nuculana arata (Hall), Girty, No. 222.
Nuculites Conrad. Grabau, No. 229.
nyssa Hall, Grabau, No. 229.
oblongatus Hall, Grabau, No. 229.
tryqueter Conrad, Grabau, No. 229.
Nyctopora Nicholson, Lambe, No. 413.
billingsi Nicholson, Lambe, No. 413.
Obolella gamagei n. sp., Hobbs, No. 320.
loperi n. sp., Walcott, No. 683.
mickwitzi n. sp., Walcott, No. 683.
namouna n. sp., Walcott, No. 683.
pandemia n. sp., Walcott, No. 683.
rhea n. sp., Walcott, No. 683.
Obolus Eichwald, Walcott, No. 683.
anceps n. sp., Walcott, No. 683.
(Lingulella) argutus n. sp., Walcott, No. 683.
auga n. sp., Walcott, No. 683.
bellus n. sp., Walcott, No. 683.
bellulus n. sp., Walcott, No. 683.
desideratus n. sp., Walcott, No. 683.
dubius n. sp., Walcott, No. 683.
ellsi n. sp., Walcott, No. 683.
euglyphus n. sp., Walcott, No. 683.
franklinensis n. sp., Walcott, No. 683.
hayesi n. sp., Walcott, No. 683.
helena n. sp., Walcott, No. 683.
ino sp., Walcott, No. 683.
lamborni var. minimus n. var., Walcott, No. 683.
leos n. sp., Walcott, No. 683.
lineolatus n. sp., Walcott, No. 683.
mosia var. osceola n. var., Walcott, No. 683.
nanno n. sp., Walcott, No. 683.
oweni n. sp., Walcott, No. 683.
phaon n. sp., Walcott, No. 683.
pogonipensis n. sp., Walcott, No. 683.
prindlei n. sp., Walcott, No. 683.
punctatus n. sp., Walcott, No. 683.
rogersi n. sp., Walcott, No. 683.
rotundatus n. sp., Walcott, No. 683.
similis n. sp., Walcott, No. 683.
sinoe n. sp., Walcott, No. 683.
tarpa n. sp., Walcott, No. 683.
willisi n. sp., Walcott, No. 683.
zetus n. sp., Walcott, No. 683.
(Lingulepis) Hall, Walcott, No. 682.
acuminatus var. meeki, Walcott, No. 682.

- **Paleontology**—Continued.
  - *Genera and species described*—Continued.
    - Odontoperis ? bradleyi Lx., White, No. 720.
      - wortheni Lx., White, No. 719.
    - Oligocarpia cf. gutbieri Goepp, White, No. 720.
      - missouriensis n. sp., White, No. 720.
    - Oligoporus ? minutus n. sp., Beede, No. 44.
    - Olivella mediavia, Harris, No. 281.
    - Omphalophloios cyclostigma (Lx.) D. W., White, No. 720.
    - Omphyma eriphyle Billings sp., Lambe, No. 414.
    - Onoclea minima n. sp., Knowlton, No. 392.
    - Oppelia ? sp. Stanton, No. 603.
    - Orbiculoidea d'Orbigny, Grabau, No. 229.
      - doria Hall, Grabau, No. 229.
      - lodiensis Vanuxem, Grabau, No. 229.
      - media Hall, Grabau, No. 229.
    - (?) Oromeryx Marsh, Scott, No. 576.
    - Orthis ? remnicha Winchell, Walcott, No. 682.
      - (?) sandbergi Winchell, Walcott, No. 682.
    - Orthoceras Breynius, Grabau, No. 229.
      - aulax Hall, Grabau, No. 229.
      - chemungense Swallow, Weller, No. 711.
      - constrictum Vanuxem, Grabau, No. 229.
      - emaceratum Hall, Grabau, No. 229.
      - eriense Hall, Grabau, No. 229.
      - exile Hall, Grabau, No. 229.
      - nuntium Hall, Grabau, No. 229.
      - rude Hall, Girty, No. 222.
      - subulatum Hall, Grabau, No. 229.
      - telamon Hall, Grabau, No. 229.
    - Orthonota Conrad, Grabau, No. 229.
      - (?) parvula Hall, Grabau, No. 229.
    - Orthosthropia strophomenoides Hall, Girty, No. 222.
    - Orthothetes Fischer de Waldheim, Grabau, No. 229.
      - arctostriatus Hall, Grabau, No. 229.
      - chemungensis (Conrad), Weller, No. 711.
      - inæqualis Hall, Girty, No. 223.
      - perversus Hall, Grabau, No. 229.
    - Oryctocephalus reynoldsi n. sp., Reed, No. 542.
    - Osmotherium Cope, Cope, No. 118.
      - spelæum Cope, Cope, No. 118.
    - Osmunda affinis Lx., Knowlton, No. 392.
    - Ostrea attenuata n. sp., Logan, No. 440.
      - beloiti n. sp., Logan, No. 438.
      - canonensis n. sp., Logan, No. 440.
      - congesta Conrad, Logan, No. 440.
      - crenula n. sp., Logan, 440.
      - crenulimarginata, Harris, No. 280.
      - exogyroidea n. sp., Logan, No. 440.
      - incurva n. sp., Logan, No. 440.
      - jewellensis n. sp., Logan, No. 440.
      - kansasensis n. sp., Logan, No. 440.
      - larva, Harris, No. 280.
      - lata n. sp., Logan, No. 440.
      - leeii n. sp., Logan, No. 440.
      - plumosa, Harris, No. 280.
      - pulaskensis, Harris, No. 280.
      - thirsæ, Harris, No. 280.
      - strigilecula White, Stanton, No. 603.
      - welleri n. sp., Logan, No. 440.
      - willistoni n. sp., Logan, No. 440.
    - Pachyphyllum sp., Girty, No. 223.

- **Paleontology**—Continued.
  - *Genera and species described*—Continued.
    - Pachyrhizodus minimus, Stewart, No. 609.
    - Palæoneilo Hall, Grabau, No. 229.
      - constricta (Conrad), Grabau, No. 229.
      - constricta (Conrad)?, Weller, No. 711.
      - emarginata (Conrad), Grabau, No. 229.
      - fecunda Hall, Grabau, No. 229.
      - muta Hall, Grabau, No. 229.
      - tenuistriata Hall, Grabau, No. 229.
      - truncata Hall, Weller, No. 711.
    - Paleotrochis, Williams, No. 741.
    - Paleschara Hall, Grabau, No. 229.
      - amplectens Hall, Grabau, No. 229.
      - intercella Hall, Grabau, No. 229.
      - reticulata Hall, Grabau, No. 229.
    - Paliurus columbi Heer, Knowlton, No. 392
      - minimus n. sp., Knowlton, No. 392.
      - zizyphoides ? Lx., Knowlton, No. 392.
    - Parabatrachus, Hay, No. 286.
    - Paracyclas Hall, Grabau, No. 229.
      - lirata (Conrad), Grabau, No. 229.
    - Parazyga Hall and Clarke, Grabau, No. 229.
      - hirsuta Hall, Grabau, No. 229.
    - Patella geometrica Merriam, Merriam, No. 481.
    - Patellostium, Girty, No. 222.
      - nodocostatum (Gurley), Girty, No. 222.
    - Pecopteris cf. arborescens (Schloth.) Brongn., White, No. 720.
      - borealis Brongn., Fontaine, No. 188.
      - clintoni Lx., White, No. 720.
      - dentata Brongn. (non Will.), White, No. 719.
      - geyleriana Nathorst, Fontaine, No. 188.
      - jenneyi n. sp., White, No. 720.
      - lesquereuxii D. W., White, No. 719.
      - oreopteridia (Schloth.) Stb., White, No. 719.
      - polymorpha Brongn,, White, No. 719.
      - pseudovestita n. sp., White, No. 720.
      - richardsoni n. sp., White, No. 719.
      - squamosa Lx., White, No. 720.
      - unita Brongn., White, No. 719.
      - vestita Lx., White, No. 720.
        - var. minor n. var., White, No. 719.
      - (Asterotheca) hemitelioides Brongn. ?, White, No. 720.
      - (Asterotheca) squamosa Lx., White, No. 719.
      - (Dactylotheca) dentata Brongn. (non Will.), White, No. 720.
    - Pelycictis lobulatus Cope, Cope, No. 118.
    - Pentacrinus asteriscus Meek and Hayden, Stanton, No. 603.
    - Pernopecten cooperensis (Shumard), Weller, No. 711.
    - Persea speciosa Heer, Hollick, No. 328.
    - Phacops Emmrich, Grabau, No. 229.
      - hudsonicus Hall, Girty, No. 222.
      - rana (Green), Grabau, No. 229.
    - Phaethonides Angelin, Grabau, No. 229.
      - gemmæus Hall and Clarke, Grabau, No, 229.
    - Phanerotinus paradoxus Winchell, Weller. No. 711.
    - Philine alabamensis Ald., Harris, No. 281.

Paleontology—Continued.
Genera and species described—Continued.
Phillipsastræa billingsi Calvin, Lambe, No. 414.
verneuili Milne-Edwards and Haime, Lambe, No. 414.
Pholadella Hall, Grabau, No. 229.
radiata (Conrad), Grabau, No. 229.
Pholadomya inæquiplicata n. sp., Stanton, No. 603.
kingi Meek, Stanton, No. 603.
Pholas alatoideus, Harris, No. 280.
Pholidops Hall, Grabau, No. 229.
hamiltoniæ Hall, Grabau, No. 229.
linguloides Hall, Grabau, No. 229.
Phragmites falcata n. sp., Knowlton, No. 392.
? latissima n. sp., Knowlton, No. 392.
Phragmodictya Hall, Hall and Clarke, Nos. 275, 277.
catelliformis Whitfield (sp.), Hall and Clarke, Nos. 275, 277.
(?) crebristriata Hall, Hall and Clarke, Nos. 275, 277.
(?) lineata Hall, Hall and Clarke, Nos. 275, 277.
patelliformis Hall, Hall and Clarke, Nos. 275, 277.
Phyllites crassifolia n. sp., Knowlton, No. 392.
Phyllonotus morulus Har., Harris, No. 281.
Phynchostegium knowltoni, n. sp., Britton, No. 65.
Physospongia Hall, Hall and Clarke, Nos. 275, 277.
alternata Hall, Hall and Clarke, Nos. 275, 277.
colletti Hall, Hall and Clarke, Nos. 275, 277.
dawsoni Whitfield (sp.) Hall and Clarke, Nos. 275, 277.
multibursaria n. sp., Hall and Clarke, Nos. 275, 277.
Pinna peracuta Shumard, Girty, No. 222.
sp., Harris, No. 280.
Pinus gracilistrobus n. sp., Knowlton, No. 392.
iddingsi n. sp., Knowlton, No. 392.
macrolepis n. sp., Knowlton, No. 392.
premurrayana n. sp., Knowlton, No. 392.
susquaensis Dawson, Fontaine, No. 188.
wardii n. sp., Knowlton, No. 392.
Pityoxylon aldersoni n. sp., Knowlton, No. 392,
amethystinum n. sp., Knowlton, No. 392.
Planolites corrugatus n. sp., Walcott, No. 681.
superbus n. sp., Walcott, No. 681.
Plasmopora Milne-Edwards and Haime 1849, Lambe, No. 413.
follis Milne-Edwards and Haime, Lambe, No. 413.
petaliformis Lonsdale (sp.), Lambe, No. 413.
Plataninium haydeni Felix, Knowlton, No. 392.
Platanus cissoides Lesquereux ?, Ward, No. 690.
guillelmæ Goepp, Knowlton, No. 392.
montana n. sp., Knowlton, No. 392.
Platecarpus, Williston, No. 747.
Paleontology—Continued.
Genera and species described—Continued.
Platyceras Conrad, Girty, No. 223.
Conrad, Grabau, No. 229.
bucculentum Hall, Grabau, No. 229.
carinatum Hall, Grabau, No. 229.
erectum Hall, Grabau, No. 229.
symmetricum, Grabau, No. 229.
thetis Hall, Grabau, No. 229.
primordialis Hall ?, Walcott, No. 682.
(Orthonychia) attenuatum Hall, Graba No. 229.
Platycrinus Miller, Grabau, No. 229.
eriensis Hall, Grabau, No. 229.
symmetricus Wachsmuth and Springe Girty, No. 223.
Platyostoma Conrad, Grabau, No. 229.
lineata Conrad, Grabau, No. 229.
var. emarginata n. var., Grabau, No. 22
minutum n. sp., Girty, No. 223.
Platyschisma missouriensis n. sp., Weller, N 711.
Platyxytrodus striatus, Hay, No. 286.
Plethomytilus Hall, Grabau, No. 229.
oviformis (Conrad), Grabau, No. 229.
Plethospira ? n. sp., Girty, No. 222.
Pleurodictyum Goldfuss, Grabau, No. 229.
stylopora (Eaton), Grabau, No. 229.
Pleuromya subcompressa Meek, Stanton, N 603.
Pleurophorus taffi n. sp., Girty, No. 222.
Pleurotoma cainei n. sp., Harris, No. 281.
capax Whitf., Harris, No. 281.
carlottæ, n. sp., Harris, No. 281.
denticulata Edw. var., Harris, No. 281.
exilloides Ald., Harris, No. 281.
georgei n. sp., Harris, No. 281.
huppertzi var., Harris, No. 280.
langdoni Heilp., Harris, No. 281.
mediavia Har. var., Harris, No. 281.
var. equiseta n. var., Harris, 281.
moniliata Heilp., Harris, No. 281.
moorei Gabb, Harris, No. 281.
nebulosa n. sp., Harris, No. 281.
roscoei n. sp., Harris, No. 281.
servatoidea Ald., Harris, No. 281.
silicata Ald., Harris, Nos. 280, 281.
(-?) siphus Ald., Harris, No. 281,
terebralis Ald. var., Harris, No. 281.
tombigbeensis Ald., Harris, No. 281.
vaughani var. sylværupis, Harris, No. 281
veatchi n. sp., Harris, No. 281.
(Mangilia) infans Har., Harris, No. 281.
Pleurotomaria de France, Grabau, No. 229.
capillaria Conrad, Grabau, No. 229.
isaacsi Hall and Whitfield (?), Girty, No 223.
itys Hall, Grabau, No. 229.
lucinia Hall, Grabau, No. 229.
planidorsalis Hall, Grabau, No. 229.
regulata Hall, Grabau, No. 229.
(?) sp., Girty, No. 223.
Pleurotomella sigma, n. sp., Harris, No. 281.
veatchi n. sp., Harris, No. 280.
Poacites sp., Hollick, No. 328.

Paleontology—Continued.

Genera and species described—Continued.

- **Polygnathus** Hinde, Grabau, No. 229.
  - **crassus** Hinde, Grabau, No. 229.
  - **cristatus** Hinde, Grabau, No. 229.
  - **dubius** Hinde, Grabau, No. 229.
  - **linguiformis** Hinde, Grabau, No. 229.
  - **nasutus** Hinde, Grabau, No. 229.
  - **palmatus** Hinde, Grabau, No. 229.
  - **pennatus** Hinde, Grabau, No. 229.
  - **princeps** Hinde, Grabau, No. 229.
  - **punctatus** Hinde, Grabau, No. 229.
  - **solidus** Hinde, Grabau, No. 229.
  - **truncatus** Hinde, Grabau, No. 229.
  - **tuberculatus** Hinde, Grabau, No. 229.
  - (?) **simplex** Hinde, Grabau, No. 229.
- **Polygyra caloosaensis** n. sp., Johnson, No. 361.
- **Polypora** McCoy, Grabau, No. 229.
  - **multiplex** Hall, Grabau, No. 229,
- **Polypsephis**, Hay, No. 286.
- **Populus balsamoides** Goepp, Knowlton, No. 392.
  - **daphnogenoides** Ward, Knowlton, No. 392.
  - **glandulifera** Heer, Knowlton, No. 392.
  - **speciosa** Ward, Knowlton, No. 392.
  - (?) **vivaria** n. sp., Knowlton, No. 392.
  - **xantholithensis** n. sp., Knowlton, No. 392.
- **Porcellia** cf., P. rectinoda Win., Weller, No. 711.
- **Porites reussiana** Duncan, Vaughan, No. 672.
- **Posidonomya? spertenuis** n. sp., Beede, No. 44.
  - **recurva** n. sp., Beede, No. 44.
- **Potamides fulvarupis** n. sp., Harris, No. 281.
- **Probeloceras** n. gen., Clarke, No. 96.
  - **lutheri** Clarke, 1885, Clarke, No. 96.
- **Primitia** Jones and Hall, Grabau, No. 229.
  - **pyriformis** n. sp., Matthew, No. 468.
  - **semniculum** Jones, Grabau, No. 229.
- **Primitiopsis** Jones, Grabau, No. 229.
  - **punctulifera** (Hall), Grabau, No. 229.
- **Prioniodus** Pander, Grabau, No. 229.
  - **abbreviatus** Hinde, Grabau, No. 229.
  - **acicularis** Hinde, Grabau, No. 229.
  - (?) **alatus** Hinde, Grabau, No. 229.
  - **angulatus** Hinde, Grabau, No. 229.
  - **armatus**, Hinde, Grabau, No. 229.
  - **clavatus** Hinde, Grabau, No. 229.
  - **erraticus** Hinde, Grabau, No. 229.
  - **panderi** Hinde, Grabau, No. 229.
  - **spicatus** Hinde, Grabau, No. 229.
- **Prionotropis woolgari** Meek, Logan, No. 438.
- **Prismodictya** n. gen., Hall and Clarke, Nos. 275, 276.
  - **alleganla** n. sp., Hall and Clarke, Nos. 275, 276.
  - **amicitiæ** n. sp., Hall and Clarke, Nos. 275, 276.
  - **aulophia** n. sp., Hall and Clarke, Nos. 275, 276.
  - **baculum** Hall (sp.), Hall and Clarke, Nos. 275, 276.
  - **banano** n. sp., Hall and Clarke, Nos. 275, 276.
  - **cercidea** n. sp., Hall and Clarke, Nos. 275, 276.

Paleontology—Continued.

Genera and species described—Continued.

- **Prismodictya choanæ** n. sp., Hall and Clarke, Nos. 275, 276.
  - **cithara** n. sp., Hall and Clarke, Nos. 275, 276.
  - **conradi** Hall (sp.), Hall and Clarke, Nos. 275, 276.
  - **corynia** n. sp., Hall and Clarke, Nos. 275, 276.
  - **filitextilis** Hall (sp.), Hall and Clarke, Nos. 275, 276.
  - **narthecia** n. sp., Hall and Clarke, Nos. 275, 276.
  - **palæa** n. sp., Hall and Clarke, Nos. 275, 276.
  - **parallela** Hall (sp.), Hall and Clarke, Nos. 275, 276.
  - **polyhedra** n. sp., Hall and Clarke, Nos. 275, 277.
  - **prismatica** Hall (sp.), Hall and Clarke, Nos. 275, 276.
  - **ptionia** n. sp., Hall and Clarke, Nos. 275, 276.
  - **spectabilis** n. sp., Hall and Clarke, Nos. 275, 276.
  - **telum** Hall (sp.), Hall and Clarke, Nos. 275, 276.
- **Productella** Hall, Grabau, No. 229.
  - **alifera** n. sp., Girty, No. 223.
  - **cooperensis** Swallow, Girty, No. 223.
  - **navicella** Hall, Grabau, No. 229.
  - **spinulicosta** Hall, Grabau, No. 229.
- **Productus burlingtonensis** Hall?, Girty, No. 222.
  - **gallatinensis** n. sp., Girty, No. 223.
  - **lævicosta** White, Girty, No. 223.
  - **parviformis** n. sp., Girty, No. 223.
  - **scabriculus** Martin, Girty, No. 223.
  - **semireticulatus** (Martin)?, Girty, Nos. 222, 223.
- **Proetus** Steininger, Grabau, No. 229.
  - **curvimarginatus** Hall, Grabau, No. 229.
  - **loganensis** Hall and Whitfield, Girty, No. 223.
  - **macrocephalus** Hall, Grabau, No. 229.
  - **peroccidens** Hall and Whitfield, Girty, No. 223.
  - **protuderans** Hall, Girty, No. 222.
  - **rowi** (Green), Grabau, No. 229.
- **Promacrus cuneatus** Hall, Weller, No. 711.
  - **websterensis** n. sp., Weller, No. 711.
- **Protagraules priscus** Matt., Matthew, No. 468.
- **Protagriochoerus** n. gen., Scott, No. 576.
- **Protarea** Milne-Edwards and Haime, Lambe, No. 413.
  - **vetusta** Hall, Lambe, No. 418.
- **Protoceras** Marsh, Scott, No. 576.
- **Protogaulus hippodus** n. gen. (sp. Cope), Riggs, No. 550.
- **Protoreodon** Scott and Osborn, Scott, No. 576.
- **Protosalvinia (Sporangites) huronensis**, Ami, No. 10.
- **Protosiphon kempanum** Matt., Matthew, No. 468.
- **Protospyræna gigas** n. sp., Stewart, No. 610.

Paleontology—Continued.

- *Genera and species described*—Continued.
  - Protylopus Wortman, Scott, No. 576.
  - Pseudocopteris Lx., White, No. 720.
    - obtusiloba (Brongn.) Lx., White, No. 720.
    - squamosa Lx. sp., White, No. 720.
    - sp., White, No. 720.
  - Pseudoliva scalina Heilp., Harris, No. 281.
    - tuberculifera Con., Harris, No. 281.
    - vetusta, Harris, No. 281.
    - vetusta var., Harris, No. 280.
  - Pseudomonotis (?) cf. hawni Meek, Beede, No. 43.
      - var. equistriata ? sp. ? nov., Beede No. 43.
    - robusta sp.? var.? nov., Beede, No. 43.
    - tenuistriata sp.? var.? nov., Beede, No. 43.
  - Pseudopecopteris macilenta (L. and H.) Lx., White, No. 719.
    - squamosa, Lx., White, No. 719.
  - Pseudo-perna n. gen., Logan, No. 440.
    - attenuata n. sp., Logan, No. 440.
    - orbicularis n. sp., Logan, No. 440.
    - rugosa n. sp., Logan, No. 440.
    - torta n. sp., Logan, No. 440.
    - wilsoni n. sp., Logan, No. 438.
  - Pterinea Goldfuss, Grabau, No. 229.
    - flabella (Conrad), Grabau, No. 229.
  - Pterinopecten Hall, Grabau, No. 229.
    - conspectus Hall, Grabau, No. 229.
    - hermes Hall, Grabau, No. 229.
    - undodus Hall, Grabau, No. 229.
  - Pteris pseudopennæformis, Hollick, No 328.
  - Pterospermites haguei n. sp., Knowlton, No. 393.
  - Pterosphenus schucherti n. gen. et sp., Lucas, No. 445.
  - Ptilodictya Lonsdale, Grabau, No. 229.
    - plumea Hall, Grabau, No. 229.
  - Ptilopora sp., Girty, No. 223.
  - Ptychoceras near crassum, Harris, No. 280.
  - Ptychodesma cf. P. minor Hall, Weller, No. 711.
  - Ptychoparia (E.) affinis Walcott, Walcott, No. 682.
    - antiqua Salter sp., Walcott, No. 682.
    - (?) diademata Hall sp., Walcott, No. 682.
    - llanoensis Walcott (?), Walcott, No. 682.
    - penfieldi n. sp., Walcott, No. 682.
    - (Lonochocephalus) wisconsensis Owen sp., Walcott, No. 682.
    - sp. undet., Walcott, No. 682.
  - Pycnodus phaseolus, Hay, No. 286.
  - Pyriopecten Hall, Grabau, No. 229.
    - orbiculatus Hall, Grabau, No. 229.
  - Pyropsis perula Ald., Harris, No. 281.
  - Quercinium lamarense n. sp., Knowlton, No. 392.
  - Quercophyllum wyomingense n. sp., Fontaine, No. 188.
    - culveri n. sp., Knowlton, No. 392.
  - Quercus consimilis ? Newby., Knowlton, No. 392.
    - ellisiana Lx., Knowlton, No. 392.
    - furcinervis americana Kn., Knowlton, No. 392.
    - grossidentata n. sp., Knowlton. No. 392.

Paleontology—Continued.

- *Genera and species described*—Continued.
  - Quercus—Continued.
    - hesperia n. sp., Knowlton, No. 392.
    - (?) magnifolia n. sp., Knowlton, No. 392.
    - microdentata n. sp., Hollick, No. 328.
    - wardiana Lx. ?, Ward, No. 690.
    - weedii n. sp., Knowlton, No. 392.
    - yanceyi n. sp., Knowlton, No. 392.
    - sp., Knowlton, No. 392.
  - Reptaria Rolle, Grabau, No. 229.
    - stolonifera Rolle, Grabau, No. 229.
  - Reteporina d'Orbigny, Grabau, No. 229.
    - striata Hall, Grabau, No. 229.
  - Reticularia cooperensis Swallow, Girty, No. 223.
    - cooperensis var., Girty, No. 223.
    - (?) peculiaris Shumard, Girty, No. 223.
    - perplexa (McChesney), Girty, No. 222.
    - (?) subrotunda Hall, Girty, No. 223.
  - Rhabdocarpus multistriatus (Presl.) Lx., White, No. 720.
    - (Pachytesta) mansfieldi Lx., White, No. 720.
  - Rhabdosispongia n. gen., Hall and Clarke, Nos. 275, 276.
    - amalthea Hall (sp.), Hall and Clarke Nos. 275, 276.
    - condroziana n. sp., Hall and Clarke, Nos. 275, 277.
  - Rhamnacinium radiatum Felix, Knowlton No. 392.
  - Rhamnus cleburni Lx., Hollick, No. 328.
  - Rhipidomella Oehlert, Grabau, No. 229.
    - burlingtonensis (Hall), Weller, No. 711.
    - cyclas Hall, Grabau, No. 229.
    - idonea Hall, Grabau, No. 229.
    - leucosia Hall, Grabau, No. 229.
    - michelini Léveillé, Girty, No. 223.
    - oblata Hall, Girty, No. 222.
      - var. emarginata Hall, Girty, No. 222.
    - penelope Hall, Grabau, No. 229.
    - vanuxemi Hall, Grabau, No. 229.
  - Rhizodus, Hay, No. 286.
  - Rhombopora Meek, Grabau, No. 229.
    - hexagona (Hall), Grabau, No. 229.
    - immersa Hall, Grabau, No. 229.
    - lineata Hall, Grabau, No. 229.
    - polygona (Hall), Grabau, No. 229.
    - reticulata (Hall), Grabau, No. 229.
    - tortalinia, Grabau, No. 229.
    - (?) transversa (Hall), Grabau, No. 229.
  - Ringicula butleriana Ald., Harris, No. 281.
    - butleriana var. lignitifera Ald., Harris, No. 281.
  - Rœmerispongia n. gen., Hall and Clarke, Nos. 275, 276.
    - gerolsteinensis F. Roemer (sp.), Hall and Clarke, Nos. 275, 276.
  - Romingeria Nicholson, Lambe, No. 413.
    - umbellifera Billings (sp.), Lambe, No. 413.
  - Rhynchonella gnathopora Meek, Stanton, No. 603.
    - myrina Hall and Whitfield, Stanton, No. 603.
  - Rhynchospira formosa (Hall), Girty, No. 222.
  - Sagenodus copeanus n. sp., Williston, No. 749.
    - textilis, Hay, No. 286.

Paleontology—Continued.

Genera and species described—Continued.

- Salix varians Heer, Knowlton, No. 392.
- Sandbergeroceras Hyatt, Clarke, No. 96.
  - syngonum n. sp., Clarke, No. 96.
- Sanguinolites websterensis n. sp., Weller, No. 711.
- Sapindopsis variabilis Fontaine, Fontaine, No. 188.
- Sapindus affinis Newby., Knowlton, No. 392.
  - angustifolius Lx., Hollick, No. 328.
  - grandifoliolus Ward, Knowlton, No. 392.
  - grandifolioloides n. sp., Knowlton, No. 392.
  - wardii n. sp., Knowlton, No. 392.
- Sapotacites americanus Lx., Hollick, No. 328.
- Sassafras mudgii Lx., Ward, No. 690.
- Saurocephalus lanciformis, Hay, Nos. 288, 293.
  - pamphagus, n. sp., Hay, Nos. 288, 293.
- Scala, Harris, No. 281.
  - exquisita Ald., Harris, No. 281.
- Scalarituba missouriensis n. gen. et. sp., Weller, No. 711.
- Scaphander alabamensis Ald., Harris, No. 281.
  - ligniticus Ald., Harris, No. 281.
- Scaphella demissa Con. var., Harris, No. 281.
  - heilprini, Harris, No. 281.
- Scaphiocrinus sp., Girty, No. 223.
- Scaphites, Logan, No. 438.
  - nodosus, Logan, No. 438.
  - warreni, Logan, No. 438.
- Schizaster lecontei n. sp., Merriam, No. 480.
- Schizobolus Ulrich, Grabau, No. 229.
  - truncatus Hall, Grabau, No. 229.
- Schizodus King, Girty, No. 222.
- Schizodus King, Grabau, No. 229.
  - æqualis Hall, Weller, No. 711.
  - affinis Herrick, Girty, No. 222.
  - appressus (Conrad), Grabau, No. 229.
  - meekanus, n. sp., Girty, No. 222.
  - pandatus, n. sp., Girty, No. 222.
  - telliniformis, n. sp., Girty, No. 222.
- Schizophoria swallovi (Hall), Weller, No. 711.
- Sciurus calycinus Cope, Cope, No. 118.
- Scleropteris distantifolia n. sp., Fontaine, No. 188.
  - rotundifolia n. sp., Fontaine, No. 188.
- Scutella gabbi Rémond, Merriam, No. 480.
  - interlineata Stimpson, Merriam, No. 480.
- Seminula humulis n. sp., Girty, No. 223.
  - immatura n. sp., No. Girty, 223.
  - madisonensis n. sp., Girty, No. 223.
    - var. pusilla n. var., Girty, No. 223.
- Sequoia couttsie Heer, Knowlton, No. 392.
  - gracilis Heer, Fontaine. No. 188.
  - langsdorfii (Brongn.) Heer, Knowlton, No. 392.
  - magnifica n. sp., Knowlton, No. 392.
  - reichenbachi (Geinitz) Heer, Fontaine, No. 196.
  - sp. Fontaine, No. 188.
- Serpulorbis sylværupis n. sp., Harris, No. 281.
- Sigaretus bilix Con., Harris, No. 281.
  - declivus Con., Harris. Nos. 280, 281.
- Sigillaria sigillarioides (Lx.), White, No. 720.
  - (Asolanus) camptotænia H. C. Wood, White, No. 720.

Paleontology—Continued.

Genera and species described—Continued.

- Sipho tuomeyi Ald., Harris, No. 281.
- Siphonalia subsclarina Heilp., Harris, No. 281.
  - sp. Harris, No. 281.
- Smilax lamarensis n. sp., Knowlton, No. 392.
- Smilodon mercerii Cope, Cope, No. 118.
- Solariella louisiana Dall., Harris, No. 281.
- Solarium bellense n. sp., Harris, Nos. 280, 281.
  - cupola Heilp., Harris, No. 281.
  - elaboratum Con., Harris, No. 281.
    - var. delphinuloides Heilp., Harris, No. 281.
    - var. intusum n. var., Harris, No. 281.
  - huppertzi Har. var., Harris, No. 281.
  - greggi Har., Harris, No. 281.
  - leanum Dall., Harris, No. 281.
  - sylværupis Har., Harris, No. 281.
- Solenomya parallela n. sp., Beede and Rogers, No. 46.
- Solenopleura? weedi, Walcott, No. 682.
- Somphospongia n. gen., Beede, No. 44.
  - multiformis, n. sp., Beede, No. 44.
- Sphenolepidium kurrianum (Dunker) Heer, Fontaine, No. 188.
  - parceramosum Fontaine, Fontaine, No. 188.
- Sphenophyllum cuneifolium (Stb.) Zeill., White, No. 719.
  - emarginatum Brongn., White, No. 720.
  - lescurianum n. sp., White, No. 720.
  - majus Brongn., White, No. 720.
  - suspectum n. sp., White, No. 719.
  - (Asterophyllites?) fasciculatum (Lx.), White, No. 720.
- Sphenopteris brittsii Lx., White, No. 720.
  - canneltonensis n. sp., White, No. 720.
  - capitata n. sp., White, No. 720.
  - chærophylloides (Brongn.) Presl., White, No. 720.
  - cristata (Brongn.) Presl., White, No. 720.
  - illinoisensis n. sp., White, No. 720.
  - lacoei D. W., White, No. 720.
  - missouriensis n. sp., White, No. 720.
  - mixta Schimp., White, No. 720.
  - pinnatifida (Lx.), White, No. 720.
  - plurinervia Heer?, Fontaine, No. 188.
  - subcrenulata (Lx.), White, No. 720.
  - suspecta n. sp., White, No. 720.
  - sp., White, No. 720.
- Sphenopteris taffii n. sp., White, No. 719.
  - van ingeni n. sp., White, No. 720.
  - wardiana, n. sp., White, No. 720.
  - (Crossotheca) ophioglossoides (Lx.), White. No. 720.
  - (Hymenotheca) broadheadi n. sp., White, No. 720.
- Sphenotus Hall, Grabau, No. 229.
  - truncatus (Conrad), Grabau, No. 229.
- Spirialis choctavensis Ald., Harris. No. 281.
  - elongatoidea Ald., Harris, No. 281.
- Spirifer Sowerby, Grabau, No. 229.
  - angustus Hall, Grabau, No. 229.
  - asper Hall, Grabau, No. 229.
  - audaculus (Conrad), Grabau, No. 229.
    - var. eatoni Hall, Grabau, No. 229.

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- *Genera and species described*—Continued.
  - Spirifer—Continued.
    - centronatus Winchell, Girty, No. 223.
      - var. semifurcatus n. var., Girty, No. 223.
    - consobrinus d'Orbigny, Grabau, No. 229.
    - engelmanni Meek, Girty, No. 223.
    - granulosus (Conrad), Grabau, No. 229.
      - var. clintoni Hall, Grabau, No. 229.
    - macronotus Hall, Grabau, No. 229.
    - marionensis Shumard (?) Girty, No. 223.
    - marionensis Shumard, Weller, No. 711.
    - mucronatus Conrad, Grabau, No. 229.
    - rockymontanus Marcou, Girty, No. 222.
    - striatus var. madisonensis n. var., Girty, No. 223.
    - subattenuatus Hall, Girty, No. 223.
    - tullius Hall, Grabau, No. 229.
    - (Delthyris) sculptilis (Hall), Grabau, No. 229.
    - (Martinia) subumbonus Hall, Grabau, No. 229.
    - (Reticularia) fimbriatus (Conrad), Grabau, No. 229.
    - sp. Girty, No. 223.
  - Spiriferina solidirostris White, Girty, No. 223.
  - Spirophyton sp., Weller, No. 711.
  - Spirorbis Lamarck, Grabau, No. 229.
    - angulatus Hall, Grabau, No. 229.
  - Stearoceras gibbosum Hyatt, Girty, No. 222.
  - Steganoblastus canadensis, White, No. 725.
  - Stemmatia bicristatus, Hay, No. 286.
    - bifurcatus, Hay, No. 286.
    - cheiriformis, Hay, No. 286.
    - compactus, Hay, No. 286.
    - keokuk, Hay, No. 286.
    - symmetricus, Hay, No. 286.
  - Stiboriopsis n. gen., Vaughan, No. 672.
    - jamaicaensis n. sp., Vaughan, No. 672.
  - Stictopora Hall, Grabau, No. 229.
    - palmipes Hall, Grabau, No. 229.
    - permarginata Hall, Grabau, No. 229.
    - recta Hall, Grabau, No. 229.
    - sinuosa Hall, Grabau, No. 229.
  - Stictoporella (?) sp,, Girty, No. 223.
  - Stigmaria evenii Lx., White, No. 720.
    - verrucosa (Martin) S. A. Miller, White, No. 720.
  - Straparollus Montfort, Grabau, No. 229.
    - rudis Hall, Grabau, No. 229.
    - utahensis Hall and Whitfield, Girty, No. 223.
    - ? sp., Weller, No. 711.
  - Streblotrypa Ulrich, Grabau, No. 229.
    - hamiltonense (Nicholson), Grabau, No. 229.
  - Streptelasma Hall, Grabau, No. 229.
    - rectum, Hall, Grabau, No. 229.
    - ungula Hall, Grabau, No. 229.
    - waynense (Safford), White, No. 222.
  - Strepula Jones and Hall, Grabau, No. 229.
    - sigmoidalis Jones, Grabau, No. 229.
  - Striatopora Hall, Lambe, No. 413.
    - flexuosa Hall, Lambe, No. 413.
    - linneana Billings, Lambe, No, 413.

Paleontology—Continued.
- *Genera and species described*—Continued.
  - Strophalosia King, Grabau, No. 229.
    - truncata (Hall), Grabau, No. 229.
  - Stropheodonta, Hall, Grabau, 229.
    - demissa Conrad, Grabau, No. 229.
    - concava Hall, Grabau, No. 229.
    - plicata Hall, Grabau, No. 229.
    - (Leptostrophia) perplana Conrad, Grabau, No. 229.
    - (Douvillina) inæquistriata (Conrad), Grabau, No. 229.
    - (Pholidostrophia) nacrea (Hall), Grabau, No. 229.
    - (Leptostrophia) junia Hall, Grabau, No. 229.
  - Strophocrinus dicyclicus n. gen. et sp., Sardeson, No. 565.
  - Stylarea von Seebach, Lambe, No. 413.
    - parva Billings (sp.), Lambe, No. 413.
  - Styliolina Karpinsky, Grabau, No. 229.
    - fissurella Hall, Grabau, No. 229.
    - spica (Hall), Grabau, No. 229.
  - Stylocœnia duerdeni n. sp., Hill, No. 672.
  - Surcula nasuta Whitf., Harris, No. 281.
  - Sycium cloacinum Cope, Cope, No. 118.
  - Syringolites Hinde 1879, Lambe, No. 413.
    - huronensis Hinde, Lambe, No. 413.
  - Syringopora Goldfuss, Lambe, No. 413.
    - aculeata n. sp., Girty, No. 223.
    - bifurcata Lonsdale, Lambe, No. 413.
    - compacta Billings, Lambe, No. 413.
    - dalmanii Billings, Lambe, No. 413.
    - hisingeri Billings, Lambe, 413.
    - infundibula Whitfield, Lambe, No. 413.
    - intermedia Billings, Lambe, No. 413.
    - maclurei Billings, Lambe, No 413.
    - nobilis Billings, Lambe, No. 413.
    - perelegans Billings, Lambe, No. 413.
    - ramulosa Goldfuss, Lambe, No. 413.
    - reticulata Goldfuss, Lambe, No. 413.
    - retiformis Billings, Lambe, No. 413.
    - surcularia n. sp., Girty, No. 223.
    - verticillata Goldfuss, Lambe, No. 413.
  - Syringotheris carteri (Hall), Weller, No. 711.
    - carteri Hall, Girty, No. 223.
  - Syrnola dalli Coss. var., Harris, No. 281.
    - trapaquara Har. n. sp., Harris, No. 281.
  - Tæniophyllum latifolium n. sp., White, No. 720.
  - Tæniopteris ? missouriensis D. W., White, No. 720.
  - Tænipora Nicholson, Grabau, No. 229.
    - exigua Nicholson, Grabau, No. 229.
  - Tapirus haysii Leidy, Cope, No. 118.
  - Taxites olriki Heer, Knowlton, No. 392.
  - Taxocrinus Phillips, Grabau, No. 229.
    - nuntius Hall, Grabau, No. 229.
  - Tancredia ? knowltoni n. sp., Stanton, No. 608.
  - Teinostoma subangulatus Meyer, Harris, No. 281.
  - Teleopternus Cope, Cope, No. 118.
    - orientalis Cope, Cope, No. 118.
  - Tellinopsis Hall, Grabau, No. 229.
    - subemarginata (Conrad), Grabau, No. 229.
  - Telmaticyon n. gen., Marsh, No. 464.

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Genera and species described—Continued.

- Tentaculites Schlotheim, Grabau, No. 229.
  - bellulus Hall, Grabau, No. 229.
  - gracilistriatus Hall, Grabau, No. 229.
- Terebratulina sp., Harris, No. 280.
- Terebrifusus amœnus Con., Harris, No. 281.
- Testudo gilbertii, Hay, No. 289.
- Tetracaulodon (Tetrabelodon) shephardii Cope, Wagner, No. 679.
- Tetradium Dana, Lambe, No. 413.
  - fibratum Safford, Lambe, No. 413.
- Tetranthera præcursoria Lx., Hollick, No. 328.
- Thamnodictya Hall, Hall and Clarke, Nos. 275, 277.
  - newberryi Hall, Hall and Clarke, Nos. 275, 277.
  - ortoni n. sp., Hall and Clarke, Nos. 275, 277.
- Thetis sp., Harris, No. 280.
- Thracia weedi n. sp., Stanton, No. 603.
  - ? montanaensis (Meek)?, Stanton, No. 603.
- Thyrsopteris brevifolia Fontaine, No. 188.
  - brevipennis Fontaine ?, Fontaine, No. 188.
  - crassinervis Fontaine, Fontaine, No. 188.
  - dentifolia n. sp., Fontaine, No. 188.
  - elliptica Fontaine, No. 188.
  - pecopteroides Fontaine, Fontaine, No. 188.
  - pinnatifida Fontaine ?, Fontaine, No. 188.
- Thysanodictya n. gen., Hall and Clarke, Nos. 275, 276, 277.
  - apleta n. sp., Hall and Clarke Nos. 275, 276.
  - edwin-halli nom. nov., Hall and Clarke, Nos. 275, 276.
  - hermenia n. sp., Hall and Clarke, Nos. 275, 276.
  - johnstoni n. sp., Hall and Clarke, Nos. 275, 276.
  - pœcilus n. sp., Hall and Clarke, Nos. 275, 276.
  - quasillum n. sp., Hall and Clarke, Nos. 275, 276.
  - randalli Hall (sp.), Hall and Clarke, Nos. 275, 276.
  - rudis Hall (sp.), Hall and Clarke, Nos. 275, 276.
  - saccus n. sp., Hall and Clarke, Nos. 275, 276.
  - scyphina n. sp., Hall and Clarke, Nos. 275, 276.
  - turricula n. sp., Hall and Clarke, Nos. 275, 276.
- ?Titanophyllum brittsii n. sp., White, No. 720.
- Tornatellæa bella Con., Harris, No. 281.
- Tornatina leai Ald., Harris, No. 281.
- Tornoceras Hyatt, Clarke, No. 96.
  - bicostatum Hall (sp.), Clarke, No. 96.
  - peracutum Hall (sp.), Clarke, No. 96.
  - rhysum n. sp., Clarke, No. 96.
  - uniangulare Conrad (sp.), Clarke, No. 96.
    - var. compressum n. var., Clarke, No. 96.
    - var. obesum n. var., Clarke, No. 96.
- Toxaspis anguillulatus Cope, Cope, No. 118.
- Toxylon longipetiolatum n. sp., Hollick, No. 328.
- Trachypora Milne-Edwards and Haime, Lambe, No. 413.
- Trachypora E. and H., Grabau, No. 229.
  - elegantula Billings, Lambe, No. 413.
  - limbata (Eaton), Grabau, No. 229.
- Trapa microphylla Lx., Knowlton, No. 392.
- Trematospira Hall, Grabau, No. 229.
  - gibbosa, Grabau, No. 229.
  - (Billings)?, Girty, No. 222.
- Triboloceras digonum (M. and W.)?, Weller, No. 711.
- Trigeria Bayle, Grabau, No. 229.
  - (?) lepida Hall, Grabau, No. 229.
- Trigonia elegantissima Meek, Stanton, No. 603.
  - eufaulensis Harris, No. 280.
  - montanaensis Meek, Stanton, No. 603.
- Triton tuomeyi Ald., Harris, No. 281.
  - (Epidromus) otopsis Con., Harris, No. 281.
  - (Ranularia) eocensis Ald., Harris, No. 281.
- Tritonidea johnsoni Ald., Harris, No. 281.
  - pachecoi n. sp., Harris, No. 280.
- Triumphis hatchetigbeensis Ald., Harris, No. 281.
- Trochoseris catadupensis n. sp., Vaughan, No. 672.
- Trochosmilia hilli n. sp., Vaughan, No. 672.
- Trophon caudatoides Ald., Harris, No. 281.
  - elegantissimus Ald., Harris, No. 281.
  - gracilis Ald., Harris, No. 281.
  - sublevis n. sp., Harris, No. 281.
- Tropidodiscus cyrtolites (Hall), Weller. No. 711.
- Tropidoleptus Hall, Grabau, No. 229.
  - carinatus (Conrad), Grabau, No. 229.
- Tuba antiquata Con., Harris, No. 281.
- Turbinella (Glyptostyla ?) baculus Ald., Harris, No. 281.
- Turbinoseris Duncan, Vaughan, No. 672.
  - cantabridgiensis n. sp., Vaughan, No. 672.
  - jamaicaensis n. sp., Vaughan, No. 672.
- Turbonilla sp., Harris, No. 281.
- Turritella clevelandia Ald. var., Harris, No. 281.
  - humerosa Con., Harris, Nos. 280, 281.
  - mortoni Con., Harris, Nos. 280, 281.
  - præcincta Con., Harris, No. 281.
- Tylodictya n. gen., Hall and Clarke, Nos. 275, 277.
  - (?) tenuis Hall (sp.) Hall and Clarke, Nos. 275 and 277.
  - warrenensis n. sp., Hall and Clarke, Nos. 275 and 277.
- Tylosaurus dyspelor, Cope, Osborn, No. 508.
- Typodus, Hay, No. 286.
- Ulmiphyllum densinerve n. sp., Fontaine, No. 188.
- Ulmus minima ? Ward, Knowlton, No. 392.
  - pseudo-fulva ? Lx., Knowlton, No. 392.
  - tenuinervis, Hollick, No. 328.
- Umbrella sylværupis n. sp., Harris, No. 281.
- Uintacrinus, Springer, No. 598.
- Uncia inexpectata Cope, Cope, No. 118.
- Uncinulus? acutiplicatus (Hall), Girty, No. 222.
  - pyramidatus Hall ?, Girty, No. 222.
- Unitrypa Hall, Grabau, No. 229.
  - scalaris Hall, Grabau, No. 229.
- Ursus americanus Pallas, Cope, No. 118.
  - haplodon Cope, Cope, No. 118.
- Venericardia planicosta, Harris, No. 280.
- Veniella sp., Harris, No. 280.
- Viburnites evansanus Ward, Ward, No. 690.

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Viburnum rotundifolium Lx., Knowlton, No. 392.
Vitulina Hall, Grabau, No. 229.
pustulosa Hall, Grabau, No. 229.
Voluta claræ n. sp., Harris, No. 281.
newcombiana Whitf., Harris, No. 281.
sp., Harris, No. 281.
Volutilithes petrosus Con., Harris, Nos. 280, 281.
Volvaria (Volvariella) alabamiensis Ald., Harris, No. 281.
Vulpes cinereoargentatus, Cope, No. 118.
latidentatus, n. sp., Cope, No. 118.
Weichselia reticulata (Stokes & Webb) Ward n. comb., Fontaine, No. 188.
Williamsonia? phoenicopsoides Ward n. sp., Fontaine, No. 188.
Woodwardia preareolata n. sp., Knowlton, No. 392.
Xenodus hertzeri, Hay, No. 286.
Xenophora conchyliophora Born., Harris, No. 281.
Xiphactinus Leidy, Stewart, No. 608.
brachygnathus n. sp., Stewart, No. 610.
Yoldia glabra n. sp., Beede and Rogers, No. 46.
Zaconthoides sp. undet., Walcott, No. 682.
Zamenis acuminatus Cope, Cope, No. 118.
Zamites borealis Heer, No. 188.
brevipennis Heer, Fontaine, No. 188.
(?) sp., Fontaine, No. 188.
Zaphrentis Rafinesque, Grabau, No. 229.
gigantea Lesueur sp., Lambe, No, 414.
minas Dawson, Lambe, No. 414.
mirabilis Billings sp., Lambe, No. 414.
simplex Hall, Grabau, No. 229.
Zephyroceras cataphractum n. sp., Clarke, No. 96.
holzapfeli n. sp., Clarke, No. 96.
Zizyphus serrulata Ward, Knowlton, No. 392.
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Big Trees folio, Turner and Ransome, No. 639.
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Granitic rocks of the Sierra Nevada, Turner, No. 633.
Replacement ore deposits, Turner, No. 634.
Canada.
A new analcite rock, Coleman, No. 107.
Corundiferous nepheline-syenite, Coleman, Nos. 108, 110.
Geology of Nipissing and Temiscaming map sheets, Barlow, No. 32.
Colorado.
Elmoro folio, Hills, No. 319.
Granite breccias of Grizzly Peak, Stone, No. 614.
Telluride folio, Cross, No. 128.
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Connecticut.
Granite-gneiss in Connecticut, Westgate, No. 717.
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Geologic notes on Wichita Mountains, Vaughan, No. 671.
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Andesite of Aroostook volcanic area, Gregory, No. 260.
Dikes of Johns Bay, Bascom, No. 39.
Massachusetts.
Geology of eastern Berkshire County, Emerson, No. 176.
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Petrographic province of Essex County, Washington, Nos. 694, 695, 696, 697.
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Crystal Falls iron-bearing district, Clements and Smyth, No. 105.
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- *Minnesota*—Continued.
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- *Montana.*
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  - Granite rocks of Butte, Weed, No. 704.
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- *New Jersey.*
  - Occurrence of nepheline-syenite, Ransome, No. 540.
  - Palisade diabase, Irving, No. 357.
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  - Augite-syenite-gneiss, Cushing, No. 132.
  - Geology of Adirondack region, Smyth, No. 596.
  - Intrusion in Inwood limestone, Eckel, No. 168.
  - Newark rocks, Kümmel, No. 395.
  - Newark system, Kümmel, No. 396.
- *Pennsylvania.*
  - Igneous rocks of York Haven, Ehrenfeld, No. 169.
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  - Geology of Tintic district, Tower and Smith, No. 632.
- *Virginia.*
  - Geology of Richmond Basin, Shaler and Woodworth, No. 581.
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  - Tacoma folio, Willis and Smith, No. 746.
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  - Absaroka folio, Hague, No. 268.
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  - Absarokite, Iddings, No. 349.
  - Akerite, Cushing, No. 132.
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  - Analcite rock, Coleman, No. 107.
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  - Andesite, Gregory, No. 260.
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  - Andesite, Iddings, Nos. 347, 348.
  - Andesite, Tower and Smith, No. 632.
  - Andesite-porphyry, Weed, No. 702.
  - Andesitic tuff, Turner and Ransome, No. 639.

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  - Aplite, Turner, No. 633.
  - Aplite, Washington, No. 695.
  - Aplite, Weed, No. 704.
  - Augite-andesite, Lord, No. 442.
  - Augite-syenite-gneiss, Cushing, No. 132.
  - Banakite, Cushing, No. 132.
  - Banakite, Iddings, No. 349.
  - Basalt, Hague, No. 268.
  - Basalt, Iddings, Nos. 347, 351.
  - Basalt, Lord, No. 442.
  - Basalt, Turner and Ransome, No. 639.
  - Basalt, Weed, Nos. 701, 702.
  - Biotite-granite, Clements and Smyth, No. 105.
  - Biotite-granite, Turner, Nos. 633, 635.
  - Camptonite, Bascom, No. 37.
  - Camptonite, Washington, No. 696.
  - Dacite, Iddings, No. 348.
  - Dacite-porphyry, Iddings, No. 345.
  - Diabase, Barlow, No. 32.
  - Diabase, Bascom, No. 39.
  - Diabase, Irving, No. 357.
  - Diabase, Lane, No. 417.
  - Diabase, Washington, No. 696.
  - Diorite, Clements and Smyth, No. 105.
  - Diorite, Crosby, No. 121.
  - Diorite, Iddings, No. 347.
  - Diorite, Washington, No. 694.
  - Diorite-monzonite, Cross, No. 128.
  - Diorite-porphyry, Lord, No. 442.
  - Diorite, porphyritic, Washington, No. 694.
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[Bulletin 172.]

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105. The Laramie and the Overlying Livingston Formation in Montana, by Walter Harvey Weed with Report on Flora, by Frank Hall Knowlton. 1893. 8°. 68 pp. 6 pl. Price 10 cents.

106. The Colorado Formation and its Invertebrate Fauna, by T. W. Stanton. 1893. 8°. 288 pp. 45 pl. Price 20 cents.

107. The Trap Dikes of the Lake Champlain Region, by James Furman Kemp and Vernon Freeman Marsters. 1893. 8°. 62 pp. 4 pl. Price 10 cents.

108. A Geological Reconnoissance in Central Washington, by Israel Cook Russell. 1893. 8°. 108 pp. 12 pl. Price 15 cents.

109. The Eruptive and Sedimentary Rocks on Pigeon Point, Minnesota, and their Contact Phenomena, by William Shirley Bayley. 1893. 8°. 121 pp. 16 pl. Price 15 cents.

110. The Paleozoic Section in the Vicinity of Three Forks, Montana, by Albert Charles Peale. 1893. 8°. 56 pp. 6 pl. Price 10 cents.

111. Geology of the Big Stone Gap Coal Field of Virginia and Kentucky, by Marius R. Campbell. 1893. 8°. 106 pp. 6 pl. Price 15 cents.

112. Earthquakes in California in 1892, by Charles D. Perrine. 1893. 8°. 57 pp. Price 10 cents.

113. A Report of Work done in the Division of Chemistry during the Fiscal Years 1891-'92 and 1892-'93. F. W. Clarke, Chief Chemist. 1893. 8°. 115 pp. Price 15 cents.

114. Earthquakes in California in 1893, by Charles D. Perrine. 1894. 8°. 23 pp. Price 5 cents.

115. A Geographic Dictionary of Rhode Island, by Henry Gannett. 1894. 8°. 31 pp. Price 5 cents.

116. A Geographic Dictionary of Massachusetts, by Henry Gannett. 1894. 8°. 126 pp. Price 15 cents.

117. A Geographic Dictionary of Connecticut, by Henry Gannett. 1894. 8°. 67 pp. Price 10 cents.

118. A Geographic Dictionary of New Jersey, by Henry Gannett. 1894. 8°. 131 pp. Price 15 cents.

119. A Geological Reconnoissance in Northwest Wyoming, by George Homans Eldridge. 1894. 8°. 72 pp. 4 pl. Price 10 cents.

120. The Devonian System of Eastern Pennsylvania and New York, by Charles S. Prosser. 1895. 8°. 81 pp. 2 pl. Price 10 cents.

121. A Bibliography of North American Paleontology, by Charles Rollin Keyes. 1894. 8°. 251 pp. Price 20 cents.

122. Results of Primary Triangulation, by Henry Gannett. 1894. 8°. 412 pp. 17 pl. Price 25 cents.

123. A Dictionary of Geographic Positions, by Henry Gannett. 1895. 8°. 183 pp. 1 pl. Price 15 cents.

124. Revision of North American Fossil Cockroaches, by Samuel Hubbard Scudder. 1895. 8°. 176 pp. 12 pl. Price 15 cents.

125. The Constitution of the Silicates, by Frank Wigglesworth Clarke. 1895. 8°. 109 pp. Price 15 cents.

126. A Mineralogical Lexicon of Franklin, Hampshire, and Hampden Counties, Massachusetts, by Benjamin Kendall Emerson. 1895. 8°. 180 pp. 1 pl. Price 15 cents.

127. Catalogue and Index of Contributions to North American Geology, 1732-1891, by Nelson Horatio Darton. 1896. 8°. 1045 pp. Price 60 cents.

128. The Bear River Formation and its Characteristic Fauna, by Charles A. White. 1895. 8°. 108 pp. 11 pl. Price 15 cents.

129. Earthquakes in California in 1894, by Charles D. Perrine. 1895. 8°. 25 pp. Price 5 cents.

130. Bibliography and Index of North American Geology, Paleontology, Petrology, and Mineralogy for 1892 and 1893, by Fred Boughton Weeks. 1896. 8°. 210 pp. Price 20 cents.

131. Report of Progress of the Division of Hydrography for the Calendar Years 1893 and 1894, by Frederick Haynes Newell, Topographer in Charge. 1895. 8°. 126 pp. Price 15 cents.

132. The Disseminated Lead Ores of Southeastern Missouri, by Arthur Winslow. 1896. 8°. 31 pp. Price 5 cents.

133. Contributions to the Cretaceous Paleontology of the Pacific Coast: The Fauna of the Knoxville Beds, by T. W. Stanton. 1895. 8°. 132 pp. 20 pl. Price 15 cents.

134. The Cambrian Rocks of Pennsylvania, by Charles Doolittle Walcott. 1896. 8°. 43 pp. 15 pl. Price 5 cents.

135. Bibliography and Index of North American Geology, Paleontology, Petrology, and Mineralogy for the Year 1894, by F. B. Weeks. 1896. 8°. 141 pp. Price 15 cents.

136. Volcanic Rocks of South Mountain, Pennsylvania, by Florence Bascom. 1896. 8°. 124 pp. 28 pl. Price 15 cents.

137. The Geology of the Fort Riley Military Reservation and Vicinity, Kansas, by Robert Hay. 1896. 8°. 35 pp. 8 pl. Price 5 cents.

138. Artesian-Well Prospects in the Atlantic Coastal Plain Region, by N. H. Darton. 1896. 8°. 228 pp. 19 pl. Price 20 cents.

139. Geology of the Castle Mountain Mining District, Montana, by W. H. Weed and L. V. Pirsson. 1896. 8°. 164 pp. 17 pl. Price 15 cents.

140. Report of Progress of the Division of Hydrography for the Calendar Year 1895, by Frederick Haynes Newell, Hydrographer in Charge. 1896. 8°. 356 pp. Price 25 cents.

141. The Eocene Deposits of the Middle Atlantic Slope in Delaware, Maryland, and Virginia, by William Bullock Clark. 1896. 8°. 167 pp. 40 pl. Price 15 cents.

142. A Brief Contribution to the Geology and Paleontology of Northwestern Louisiana, by T. Wayland Vaughan. 1896. 8°. 65 pp. 4 pl. Price 10 cents.

143. A Bibliography of Clays and the Ceramic Arts, by John C. Branner. 1896. 8°. 114 pp. Price 15 cents.

144. The Moraines of the Missouri Coteau and their Attendant Deposits, by James Edward Todd. 1896. 8°. 71 pp. 21 pl. Price 10 cents.

145. The Potomac Formation in Virginia, by W. M. Fontaine. 1896. 8°. 149 pp. 2 pl. Price 15 cents.

146. Bibliography and Index of North American Geology, Paleontology, Petrology, and Mineralogy for the Year 1895, by F. B. Weeks. 1896. 8°. 130 pp. Price 15 cents.

147. Earthquakes in California in 1895, by Charles D. Perrine, Assistant Astronomer in Charge of Earthquake Observations at the Lick Observatory. 1896. 8°. 23 pp. Price 5 cents.

148. Analyses of Rocks, with a Chapter on Analytical Methods, Laboratory of the United States Geological Survey, 1880 to 1896, by F. W. Clarke and W. F. Hillebrand. 1897. 8°. 306 pp. Price 20 cents.

149. Bibliography and Index of North American Geology, Paleontology, Petrology, and Mineralogy for the Year 1896, by Fred Boughton Weeks. 1897. 8°. 152 pp. Price 15 cents.

150. The Educational Series of Rock Specimens Collected and Distributed by the United States Geological Survey, by Joseph Silas Diller. 1898. 8°. 400 pp. 47 pl. Price 25 cents.

151. The Lower Cretaceous Gryphæas of the Texas Region, by R. T. Hill and T. Wayland Vaughan. 1898. 8°. 139 pp. 35 pl. Price 15 cents.

152. A Catalogue of the Cretaceous and Tertiary Plants of North America, by F. H. Knowlton. 1898. 8°. 247 pp. Price 20 cents.

153. A Bibliographic Index of North American Carboniferous Invertebrates, by Stuart Weller. 1898. 8°. 653 pp. Price 35 cents.

154. A Gazetteer of Kansas, by Henry Gannett. 1898. 8°. 246 pp. 6 pl. Price 20 cents.

155. Earthquakes in California in 1896 and 1897, by Charles D. Perrine, Assistant Astronomer in Charge of Earthquake Observations at the Lick Observatory. 1898. 8°. 47 pp. Price 5 cents.

156. Bibliography and Index of North American Geology, Paleontology, Petrology, and Mineralogy for the Year 1897, by Fred Boughton Weeks. 1898. 8°. 130 pp. Price 15 cents.

157. The Gneisses, Gabbro-Schists, and Associated Rocks of Southwestern Minnesota, by Christopher Webber Hall. 1899. 8°. 160 pp. 27 pl. Price 45 cents.

158. The Moraines of Southeastern South Dakota and their Attendant Deposits, by James Edward Todd. 1899. 8°. 171 pp. 27 pl. Price 25 cents.

159. The Geology of Eastern Berkshire County, Massachusetts, by B. K. Emerson. 1899. 8°. 139 pp. 9 pl. Price 20 cents.

160. A Dictionary of Altitudes in the United States (Third Edition), compiled by Henry Gannett. 1899. 8°. 775 pp. Price 40 cents.

161. Earthquakes in California in 1898, by Charles D. Perrine, Assistant Astronomer in Charge of Earthquake Observations at the Lick Observatory. 1899. 8°. 31 pp. 1 pl. Price 5 cents.

162. Bibliography and Index of North American Geology, Paleontology, Petrology, and Mineralogy for the Year 1898, by Fred Boughton Weeks. 1899. 8°. 163 pp. Price 15 cents.

163. Flora of the Montana Formation, by Frank Hall Knowlton. 1900. 8°. 118 pp. 19 pl. Price 15 cents.

164. Reconnaissance in the Rio Grande Coal Fields of Texas, by Thomas Wayland Vaughan, including a Report on Igneous Rocks from the San Carlos Coal Field, by E. C. E. Lord. 1900. 8°. 100 pp. 11 pl. and maps. Price 20 cents.

165. Contributions to the Geology of Maine, by Henry S. Williams and Herbert E. Gregory. 1900. 8°. 212 pp. 14 pl. Price 25 cents.

166. A Gazetteer of Utah, by Henry Gannett. 1900. 8°. 43 pp. 1 map. Price 15 cents.

167. Contributions to Chemistry and Mineralogy from the Laboratory of the United States Geological Survey, Frank W. Clarke, Chief Chemist. 1900. 8°. 166 pp. Price 15 cents.

168. Analyses of Rocks, Laboratory of the United States Geological Survey, 1880 to 1899, tabulated by F. W. Clarke, Chief Chemist. 1900. 8°. 308 pp. Price 20 cents.

169. Altitudes in Alaska, by Henry Gannett. 1900. 8°. 13 pp. Price 5 cents.

170. Survey of the Boundary Line between Idaho and Montana from the International Boundary to the Crest of the Bitterroot Mountains, by Richard Urquhart Goode. 1900. 8°. 67 pp. 14 pl. Price 15 cents.

171. Boundaries of the United States and of the Several States and Territories, with an Outline of the History of all Important Changes of Territory (Second Edition), by Henry Gannett. 1900. 8°. 142 pp. 53 pl. Price 30 cents.

172. Bibliography and Index of North American Geology, Paleontology, Petrology, and Mineralogy for the Year 1899, by Fred Boughton Weeks. 1900. 8°. 141 pp. Price 15 cents.

In press:

173. Synopsis of American Fossil Bryozoa, including Bibliography and Synonymy, by John M. Nickles and Ray S. Bassler.

174. Survey of the Northwestern Boundary of the United States, 1857-1861, by Marcus Baker.

175. Triangulation and Spirit Leveling in Indian Territory, by C. H. Fitch.

176. Some Principles and Methods of Rock Analysis, by W. F. Hillebrand.

In preparation:

— Bibliography and Catalogue of the Fossil Vertebrata of North America, by Oliver Perry Hay.

WATER-SUPPLY AND IRRIGATION PAPERS.

By act of Congress approved June 11, 1896, the following provision was made:

"*Provided*, That hereafter the reports of the Geological Survey in relation to the gauging of streams and to the methods of utilizing the water resources may be printed in octavo form, not to exceed one hundred pages in length and five thousand copies in number; one thousand copies of which shall be for the official use of the Geological Survey, one thousand five hundred copies shall be delivered to the Senate, and two thousand five hundred copies shall be delivered to the House of Representatives, for distribution."

Under this law the following papers have been published:

1. Pumping Water for Irrigation, by Herbert M. Wilson. 1896. 8°. 57 pp. 9 pl.
2. Irrigation near Phœnix, Arizona, by Arthur P. Davis. 1897. 8°. 97 pp. 31 pl.
3. Sewage Irrigation, by George W. Rafter. 1897. 8°. 100 pp. 4 pl.
4. A Reconnoissance in Southeastern Washington, by Israel Cook Russell. 1897. 8°. 96 pp. 7 pl.
5. Irrigation Practice on the Great Plains, by Elias Branson Cowgill. 1897. 8°. 39 pp. 12 pl.
6. Underground Waters of Southwestern Kansas, by Erasmuth Haworth. 1897. 8°. 65 pp. 12 pl.
7. Seepage Waters of Northern Utah, by Samuel Fortier. 1897. 8°. 50 pp. 3 pl.
8. Windmills for Irrigation, by E. C. Murphy. 1897. 8°. 49 pp. 8 pl.
9. Irrigation near Greeley, Colorado, by David Boyd. 1897. 8°. 90 pp. 21 pl.
10. Irrigation in Mesilla Valley, New Mexico, by F. C. Barker. 1898. 8°. 51 pp. 11 pl.
11. River Heights for 1896, by Arthur P. Davis. 1897. 8°. 100 pp.
12. Underground Waters of Southeastern Nebraska, by N. H. Darton. 1898. 8°. 56 pp. 21 pl.
13. Irrigation Systems in Texas, by William Ferguson Hutson. 1898. 8°. 67 pp. 10 pl.
14. New Tests of Pumps and Water-Lifts used in Irrigation, by O. P. Hood. 1898. 8°. 91 pp. 1 pl.
15. Operations at River Stations, 1897, Part I. 1898. 8°. 100 pp.
16. Operations at River Stations, 1897, Part II. 1898. 8°. 101-200 pp.
17. Irrigation near Bakersfield, California, by C. E. Grunsky. 1898. 8°. 96 pp. 16 pl.

18. Irrigation near Fresno, California, by C. E. Grunsky. 1898. 8°. 94 pp. 14 pl.
19. Irrigation near Merced, California, by C. E. Grunsky. 1899. 8°. 59 pp. 11 pl.
20. Experiments with Windmills, by T. O. Perry. 1899. 8°. 97 pp. 12 pl.
21. Wells of Northern Indiana, by Frank Leverett. 1899. 8°. 82 pp. 2 pl.
22. Sewage Irrigation, Part II, by George W. Rafter. 1899. 8°. 100 pp. 7 pl.
23. Water-right Problems of the Bighorn Mountains, by Elwood Mead. 1899. 8°. 62 pp. 7 pl.
24. Water Resources of the State of New York, Part I, by G. W. Rafter. 1899. 8°. 99 pp. 13 pl.
25. Water Resources of the State of New York, Part II, by G. W. Rafter. 1899. 8°. 101-200 pp. 12 pl.
26. Wells of Southern Indiana (Continuation of No. 21), by Frank Leverett. 1899. 8°. 64 pp.
27. Operations at River Stations for 1898, Part I. 1899. 8°. 100 pp.
28. Operations at River Stations for 1898, Part II. 1899. 8°. 101-200 pp.
29. Wells and Windmills in Nebraska, by Erwin H. Barbour. 1899. 8°. 85 pp. 27 p..
30. Water Resources of the Lower Peninsula of Michigan, by Alfred C. Lane. 1899. 8°. 97 pp. 7 pl.
31. Lower Michigan Mineral Waters, by Alfred C. Lane. 1899. 8°. 97 pp. 4 pl.
32. Water Resources of Puerto Rico, by Herbert M. Wilson. 1899. 8°. 48 pp. 17 pl.
33. Storage of Water on Gila River, Arizona, by Joseph B. Lippincott. 1900. 8°. 98 pp. 33 pl.
34. Geology and water resources of SE. South Dakota, by J. E. Todd. 1900. 8°. 34 pp. 19 pls.
35. Operations at River Stations, 1899, Part I. 1900. 8°. 100 pp.
36. Operations at River Stations, 1899, Part II. 1900. 8°. 101-198 pp.
37. Operations at River Stations, 1899, Part III. 1900. 8°. 199-298 pp.
38. Operations at River Stations, 1899, Part IV. 1900. 8°. 299-396 pp.
39. Operations at River Stations, 1899, Part V. 1900. 8°. 397-471 pp.

TOPOGRAPHIC MAP OF THE UNITED STATES.

When, in 1882, the Geological Survey was directed by law to make a geologic map of the United States, there was in existence no suitable topographic map to serve as a base for the geologic map. The preparation of such a topographic map was therefore immediately begun. About one-fifth of the area of the country, excluding Alaska, has now been thus mapped. The map is published in atlas sheets, each sheet representing a small quadrangular district, as explained under the next heading. The separate sheets are sold at 5 cents each when fewer than 100 copies are purchased, but when they are ordered in lots of 100 or more copies, whether of the same sheet or of different sheets, the price is 2 cents each. The mapped areas are widely scattered, nearly every State being represented. About 900 sheets have been engraved and printed; they are tabulated by States in the Survey's "List of Publications," a pamphlet which may be had on application.

The map sheets represent a great variety of topographic features, and with the aid of descriptive text they can be used to illustrate topographic forms. This has led to the projection of an educational series of topographic folios, for use wherever geography is taught in high schools, academies, and colleges. Of this series the first two folios have been issued, viz:

1. Physiographic types, by Henry Gannett, 1898, folio, consisting of the following sheets and 4 pages of descriptive text: Fargo (N. Dak.-Minn.), a region in youth; Charleston (W. Va.), a region in maturity; Caldwell (Kans.), a region in old age; Palmyra (Va.), a rejuvenated region; Mount Shasta (Cal.), a young volcanic mountain; Eagle (Wis.), moraines; Sun Prairie (Wis.), drumlins; Donaldsonville (La.), river flood plains; Boothbay (Me.), a fiord coast; Atlantic City (N. J.), a barrier-beach coast.

2. Physiographic types, by Henry Gannett, 1900, folio, consisting of the following sheets and 11 pages of descriptive text: Norfolk (Va.-N. C.), a coast swamp; Marshall (Mo.), a graded river; Lexington (Nebr.), an overloaded stream; Harrisburg (Pa.), Appalachian ridges; Poteau Mountain (Ark.-Ind. T.), Ozark ridges; Marshall (Ark.), Ozark Plateau; West Denver (Colo.), hogbacks; Mount Taylor (N. Mex.), volcanic peaks, plateaus, and necks; Cucamonga (Cal.), alluvial cones; Crater Lake special (Oreg.), a crater.

GEOLOGIC ATLAS OF THE UNITED STATES.

The Geologic Atlas of the United States is the final form of publication of the topographic and geologic maps. The atlas is issued in parts, or folios, progressively as the surveys are extended, and is designed ultimately to cover the entire country.

Under the plan adopted the entire area of the country is divided into small rectangular districts (designated *quadrangles*), bounded by certain meridians and parallels. The unit of survey is also the unit of publication, and the maps and descriptions of each rectangular district are issued as a folio of the Geologic Atlas.

Each folio contains topographic, geologic, economic, and structural maps, together with textual descriptions and explanations, and is designated by the name of a principal town or of a prominent natural feature within the district.

Two forms of issue have been adopted, a "library edition" and a "field edition." In both the sheets are bound between heavy paper covers, but the library copies are permanently bound, while the sheets and covers of the field copies are only temporarily wired together.

Under the law a copy of each folio is sent to certain public libraries and educational institutions. The remainder are sold at 25 cents each, except such as contain an unusual amount of matter, which are priced accordingly. Prepayment is obligatory. The folios ready for distribution are here listed.

No.	Name of sheet.	State.	Limiting meridians.	Limiting parallels.	Area, in square miles.	Price, in cents.
1	Livingston	Montana	110°-111°	45°-46°	3,354	25
2	Ringgold	Georgia Tennessee	85°-85° 30′	34° 30′-35°	980	25
3	Placerville	California	120° 30′-121°	38° 30′-39°	932	25
4	Kingston[a]	Tennessee	84° 30′-85°	35° 30′-36°	969	25
5	Sacramento	California	121°-121° 30′	38° 30′-39°	932	25
6	Chattanooga	Tennessee	85°-85° 30′	35°-35° 30′	975	25
7	Pikes Peak[a]	Colorado	105°-105° 30′	38° 30′-39°	932	25
8	Sewanee	Tennessee	85° 30′-86°	35°-35° 30′	975	25
9	Anthracite-Crested Butte.	Colorado	106° 45′-107° 15′	38° 45′-39°	465	50
10	Harpers Ferry	Virginia West Va. Maryland.	77° 30′-78°	39°-39° 30′	925	25
11	Jackson	California.	120° 30′-121°	38°-38° 30′	938	25
12	Estillville	Virginia Kentucky. Tennessee	82° 30′-83°	36° 30′-37°	957	25
13	Fredericksburg	Maryland. Virginia	77°-77° 30′	38°-38° 30′	938	25
14	Staunton	Virginia West Va.	79°-79° 30′	38°-38° 30′	938	25
15	Lassen Peak	California.	121°-122°	40°-41°	3,634	25
16	Knoxville	Tennessee N. Carolina	83° 30′-84°	35° 30′-36°	925	25
17	Marysville	California	121° 30′-122°	39°-39° 30′	925	25
18	Smartsville	California	121°-121° 30′	39°-39° 30′	925	25
19	Stevenson	Alabama Georgia Tennessee	85° 30′-86°	34° 30′-35°	980	25
20	Cleveland	Tennessee	84° 30′-85°	35°-35° 30′	975	25
21	Pikeville	Tennessee	85°-85° 30′	35° 30′-36°	969	25
22	McMinnville	Tennessee	85° 30′-86°	35° 30′-36°	969	25
23	Nomini	Maryland. Virginia	76° 30′-77°	38°-38° 30′	938	25
24	Three Forks	Montana	111°-112°	45°-46°	3,354	50
25	Loudon	Tennessee	84°-84° 30′	35° 30′-36°	969	25
26	Pocahontas	Virginia West Va.	81°-81° 30′	37°-37° 30′	951	25
27	Morristown	Tennessee	83°-83° 30′		963	25
28	Piedmont	Maryland. West Va.	79°-79° 30′	39°-39° 30′	925	25
29	Nevada City:					
	Nevada City	California.	121° 00′ 25″-121° 03′ 45″	39° 13′ 50″-39° 17′ 16″	11.65	50
	Grass Valley		121° 01′ 35″-121° 05′ 04″	39° 10′ 22″-39° 13′ 50″	12.09	
	Banner Hill		120° 57′ 05″-121° 00′ 25″	39° 13′ 50″-39° 17′ 16″	11.65	
30	Yellowstone National Park:					
	Gallatin Canyon Shoshone Lake	Wyoming.	110°-111°	44°-45°	3,412	75
31	Pyramid Peak	California.	120°-120° 30′	38° 30′-39°	932	25
32	Franklin	Virginia West Va.	79°-79° 30′	38° 30′-39°	932	25
33	Briceville	Tennessee	84°-84° 30′	36°-36° 30′	963	25
34	Buckhannon	West Va.	80°-80° 30′	38° 30′-39°	932	25
35	Gadsden	Alabama.	86°-86° 30′	34°-34° 30′	986	25
36	Pueblo	Colorado	104° 30′-105°	38°-38° 30′	938	50
37	Downieville	California.	120° 30′-121°	39° 30′-40°	919	25
38	Butte Special	Montana	112° 29′ 30″-112° 36′ 42″	45° 59′ 28″-46° 02′ 54″	22.80	50
39	Truckee	California.	120°-120° 30′	39°-39° 30′	925	25
40	Wartburg	Tennessee	84° 30′-85°	36°-36° 30′	963	25
41	Sonora	California.	120°-120° 30′	37° 30′-38°	944	25
42	Nueces	Texas	100°-100° 30′	29° 30′-30°	1,035	25
43	Bidwell Bar	California.	121°-121° 30′	39° 30′-40°	918	25
44	Tazewell	Virginia West Va.	81° 30′-82°	37°-37° 30′	950	25
45	Boise	Idaho	116°-116° 30′	43° 30′-44°	864	25
46	Richmond	Kentucky	84°-84° 30′	37° 30′-38°	944	25
47	London	Kentucky	84°-84° 30′	37°-37° 30′	950	25
48	Tenmile District Special.	Colorado	106° 8′-106° 16′	39° 22′ 30″-39° 30′ 30″	55	25
49	Roseburg	Oregon	123°-123° 30′	43°-43° 30′	871	25
50	Holyoke	Mass Conn	72° 30′-73°	42°-42° 30′	885	50
51	Big Trees	California	120°-120° 30′	38°-38° 30′	938	25
52	Absaroka:					
	Crandall Ishawooa	Wyoming.	109° 30′-110°	44°-44° 30′	1,706	25
53	Standingstone	Tennessee	85°-85° 30′	36°-36° 30′	963	25

[a] Out of stock.

No.	Name of sheet.	State.	Limiting meridians.	Limiting parallels.	Area, in square miles.	Price, in cents.
54	Tacoma	Washington.	122°-122° 30′	47°-47° 30′	812	25
55	Fort Benton	Montana	110°-111°	47°-48°	3, 273	25
56	Little Belt Mts	Montana	110°-111°	46°-47°	3, 295	25
57	Telluride	Colorado	107° 45′-108°	37° 45′-38°	236	25
58	Elmoro	Colorado	104°-104° 30′	37°-37° 30′	950	25
59	Bristol	Virginia Tennessee	82°-82° 30′	36° 30′-37°	957	25
62	Menominee Special	Michigan	87° 44′-88° 09′	45° 44′-45° 55′	264	25

STATISTICAL PAPERS.

Mineral Resources of the United States, 1882, by Albert Williams, jr. 1883. 8°. xvii, 813 pp. Price 50 cents.

Mineral Resources of the United States, 1883 and 1884, by Albert Williams, jr. 1885. 8°. xiv, 1016 pp. Price 60 cents.

Mineral Resources of the United States, 1885. Division of Mining Statistics and Technology. 1886. 8°. vii, 576 pp. Price 40 cents.

Mineral Resources of the United States, 1886, by David T. Day. 1887. 8°. viii, 813 pp. Price 50 cents.

Mineral Resources of the United States, 1887, by David T. Day. 1888. 8°. vii, 832 pp. Price 50 cents.

Mineral Resources of the United States, 1888, by David T. Day. 1890. 8°. vii, 652 pp. Price 50 cents.

Mineral Resources of the United States, 1889 and 1890, by David T. Day. 1892. 8°. viii, 671 pp. Price 50 cents.

Mineral Resources of the United States, 1891, by David T. Day. 1893. 8°. vii, 630 pp. Price 50 cents.

Mineral Resources of the United States, 1892, by David T. Day. 1893. 8°. vii, 850 pp. Price 50 cents.

Mineral Resources of the United States, 1893, by David T. Day. 1894. 8°. viii, 810 pp. Price 50 cents.

On March 2, 1895, the following provision was included in an act of Congress:

"*Provided*, That hereafter the report of the mineral resources of the United States shall be issued as a part of the report of the Director of the Geological Survey."

In compliance with this legislation the following reports have been published:

Mineral Resources of the United States, 1894, David T. Day, Chief of Division. 1895. 8°. xv, 646 pp., 23 pl.; xix, 735 pp., 6 pl. Being Parts III and IV of the Sixteenth Annual Report.

Mineral Resources of the United States, 1895, David T. Day, Chief of Division. 1896. 8°. xxiii, 542 pp., 8 pl. and maps; iii, 543-1058 pp., 9-13 pl. Being Part III (in 2 vols.) of the Seventeenth Annual Report.

Mineral Resources of the United States, 1896, David T. Day, Chief of Division. 1897. 8°. xii, 642 pp., 1 pl.; 643-1400 pp. Being Part V (in 2 vols.) of the Eighteenth Annual Report.

Mineral Resources of the United States, 1897, David T. Day, Chief of Division. 1898. 8°. viii, 651 pp., 11 pl.; viii, 706 pp. Being Part VI (in 2 vols.) of the Nineteenth Annual Report.

Mineral Resources of the United States, 1898, David T. Day, Chief of Division. 1899. 8°. viii, 616 pp.; ix, 804 pp., 1 pl. Being Part VI (in 2 vols.) of the Twentieth Annual Report.

The money received from the sale of the Survey publications is deposited in the Treasury, and the Secretary of the Treasury declines to receive bank checks, drafts, or postage stamps; all remittances, therefore, must be by MONEY ORDER, made payable to the Director of the United States Geological Survey, or in CURRENCY—the exact amount. Correspondence relating to the publications of the Survey should be addressed to—

THE DIRECTOR,
UNITED STATES GEOLOGICAL SURVEY,
WASHINGTON, D. C.

WASHINGTON, D. C., *August*, 1900.

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NICKLES AND BASSLER

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INCLUDING

BIBLIOGRAPHY AND SYNONYMY

BY

JOHN M. NICKLES AND RAY S. BASSLER

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LETTER OF TRANSMITTAL.

CINCINNATI, OHIO,
May 21, 1900.

SIR: I have the honor to submit herewith, for publication as a bulletin of the United States Geological Survey, the manuscript of a joint work by Mr. Ray S. Bassler and myself, entitled A Synopsis of American Fossil Bryozoa, including Bibliography and Synonymy.

Very respectfully,

JOHN M. NICKLES.

Hon. CHARLES D. WALCOTT,
Director United States Geological Survey.

A SYNOPSIS OF AMERICAN FOSSIL BRYOZOA.

By JOHN M. NICKLES and RAY S. BASSLER.

INTRODUCTION AND ACKNOWLEDGMENTS.

So voluminous has the literature of natural history become that the workers in any special branch, and the general student as well, feel the need of compilations showing what has been done. This need, keenly felt in our study of the fossil bryozoa, compelled us to begin such a compilation some years ago. This we now place at the service of our fellow-workers with the hope that it may lighten the labors of the systematist and open the way for an enlarged use of the bryozoa in stratigraphy.

The bryozoa are generally admitted to be one of the most difficult groups of fossils. They are often of small size and can seldom be determined by the unassisted eye. Their accurate discrimination necessitates tedious study. Few have cared to give this. Because, also, great uncertainty has prevailed as to what constitutes classificatory characters, a large amount of confusion and synonymy cumbers the literature of the subject. Thus the study of the bryozoa has become doubly repellent.

The extended investigations of the structure of fossil bryozoa made by Mr. E. O. Ulrich, following in the lines pioneered by Dr. H. Alleyne Nicholson, have shown that we can not be sure of the position of any form in the scheme of classification until we have learned its internal structure by means of thin sections examined microscopically. This mode of investigation is difficult and tedious, but our studies have convinced us that a knowledge of internal characters is absolutely essential to a correct understanding of phylogeny and systematic position.

As but few authors have described the internal structure of their species, and as those who have given descriptions have not always had a clear understanding of what is essential in the appearance presented by thin sections, it is not possible to be sure of the generic placement of a large number of species. Some authors have referred species to genera to which we are certain they do not belong; but as enough has not been made known of such forms to enable us to refer them to other genera, even doubtfully, we have left the species where placed by their authors, but have followed the generic name with two interrogation points (??).

We have deemed it best to be conservative in the matter of reducing to synonyms, and only where the author himself or some very good authority or our own investigation has justified such a course have we relegated a species to synonymy. At the same time we feel sure that future studies will show that a considerable number of species given in our catalogue as valid are synonyms of species previously described. This is especially the case with the bryozoa of the Hamilton group. These have been dealt with by a number of workers, most of whom have seemed to not concern themselves very much about what others may have been doing.

Some genera which future research may prove to be bryozoan we have excluded. Such are Aulopora, Monilopora, Vermipora, Striatopora, Michelinia, Chætetes, Favosites, and Tetradium.

The catalogue gives a list, complete so far as we know, of the described species of bryozoa from American Paleozoic formations, arranged alphabetically under their genera, which are also arranged alphabetically for convenient reference. The bibliography of each species is given under its caption, thus enabling the student to easily trace the history of any particular form in the literature. The citations under the genus nearly always refer to a diagnosis; it has seemed to be of no value to record citations which do not contain some substantial contribution to the knowledge of the genus.

We have not been able to deal with American Mesozoic and Tertiary bryozoa in the same manner. Practically nothing has been done with these since the work of Gabb and Horn in 1862. But not much can be done yet, for the classification below the higher groups of recent and post-Paleozoic bryozoa is in a most chaotic condition. This systematization must be done by European writers, as America has but a comparatively feeble representation of post-Paleozoic bryozoa. The subject is difficult, but the researches of Smitt, Hincks, Jullien, and especially Waters, are laying a sure foundation upon which the classification of the future may be safely builded. As the best that can be done at present, we have given a list of all publications describing American Mesozoic and Tertiary bryozoa, with the species described in each.

As additional helps to the study of the bryozoa we have given a brief outline of the classification, with terminology and diagnoses of genera, families, and suborders; tables showing the distribution of genera and species geologically; and various notes and hints that we deemed might prove acceptable to the student.

One feature we have added which seems a little foreign to our purpose, but we believe it will be appreciated. It is a list of publications, as complete as we have been able to make it, treating of bryozoa.

This list will give a very fair idea of what has thus far been done for the bryozoa. For kindly help which has done much to make this list as full as it is, we have to thank Dr. Josua Lindahl, the accomplished Director of the Cincinnati Society of Natural History, and many workers abroad, more particularly Prof. Sidney F. Harmer, Mr. Arthur William Waters, Dr. Ed. Pergens, Prof. Hinrich Nitsche, Prof. E. Ehlers, Prof. F. A. Smitt, M. Gustave Dollfus, Inspector G. M. R. Levinsen, Mr. Robert Etheridge, jr., and Dr. A. Neviani.

It remains to acknowledge our very great indebtedness to Mr. E. O. Ulrich, of whose lifelong studies of the bryozoa, published and unpublished, carried on with a most noble integrity of purpose, often under most untoward circumstances, we have been freely permitted to avail ourselves.

To the Director of the United States Geological Survey, Hon. Charles D. Walcott, whose keen appreciation of all that tends to further geological and paleontological science has been many times proved, we are indebted for many favors.

EXPLANATORY NOTES.

It has seemed advisable to give a few brief explanatory notes.

1. In the catalogue of genera and species, valid genera and species are in black-faced type; an interrogation point following the generic name indicates that it is not certain that the species belongs to the genus under which it is placed; two interrogation points following the generic name indicate that, while we have left the species where it was referred by the author, we know that it does not belong there, but we do not know where it does belong. As a rule, we have excluded these species from the tables giving the numbers of species.

2. In giving the geologic formation we have usually adhered to commonly accepted designations, though this sometimes produces seeming ambiguity. Thus, when Trenton appears alone, followed by the locality, it denotes the group; when followed by a parenthesis including Black River or Stones River it denotes the period. Trenton in parentheses means the group. For the Trenton period Clarke and Schuchert[1] have proposed the name Mohawkian.

After the term Cincinnati (period) we have given the group in parentheses. This we have done because very few authors have given the group from which their species were derived. The recognition of these groups is comparatively recent.

The Lower Helderberg we have included with the Silurian in our table of formations. It is still an open question to which age it more properly belongs, the Devonian or the Silurian.

We have continued to use the name Upper Helderberg, though the name Ulsterian, lately proposed by Clarke and Schuchert,[1] may prove a better designation. Prof. James Hall regarded the locality at the Falls of the Ohio as of Upper Helderberg age, but we have followed Mr. E. O. Ulrich in considering this locality of Hamilton age. Future researches may prove that the Upper Helderberg and Hamilton, as now commonly understood, are to some extent synchronous.

---

[1] Science, new ser., X, 1899, pp. 874-878.

To avoid ambiguity we have adopted the term Mississippian for the formations underlying the Coal Measures and overlying the Devonian, and have used the grouping of these formations given by Williams and Keyes, with some modifications.

3. In the diagnoses of suborders, families, and genera we thought it advisable to give the number of undescribed species known to us, as it would give a better idea of the number of bryozoa known from American Paleozoic strata. These undescribed species are in the collections of Mr. E. O. Ulrich and the authors.

4. In the list of publications preceding the catalogue of genera and species we have placed an asterisk before those which are of most importance to the student of the bryozoa. The dates we have given do not always agree with those on the title-pages. We have given the date of distribution in cases where we know this to be different from the date of publication.

CLASSIFICATION.

SYSTEMATIC POSITION.

The earliest investigators of the bryozoa regarded them as plants, but by the beginning of the nineteenth century there was general agreement among naturalists as to the animal nature of these organisms, often so plant-like in appearance. For a time their systematic position remained in doubt, and they were uneasily shifted from class to class. In 1830 J. V. Thompson published his discoveries, On Polyzoa, a New Animal Discovered as an Inhabitant of some Zoophites;[1] whence most British authors have applied the name Polyzoa to these organisms, speedily dignified as a class. Almost simultaneously C. G. Ehrenberg[2] separated these organisms as a group of his Phytozoa Polypi under the name Bryozoa; which name became current among Continental authors and seems now gradually superseding Thompson's name also among British writers. For a considerable time the Bryozoa, with the Brachiopoda and Ascidia, formed the "subkingdom" Molluscoidea, but the Ascidia have been removed from this assemblage, and doubts have arisen whether the points of agreement of bryozoa and brachiopoda are of fundamental importance. The determination of the exact affinities of the bryozoa remains a subject for investigations.

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[1] Zool. Researches, No. 5, pp. 89-102, pls. i-iii.

[2] Symbolæ Physicæ, seu Icones et Descriptiones Animalium Evertebratorum, 1828-1831.

HISTORY OF CLASSIFICATION.

The first serious attempt at a classification of the bryozoa was made by D'Orbigny.[1] D'Orbigny's wide acquaintance with recent and fossil bryozoa has perhaps been equaled by no subsequent writer. But the system he devised was so largely artificial and burdened with so perplexing a nomenclature that it failed to gain acceptance. The labors of Nitsche, Allman, and Busk have fixed the principal groups. To Nitsche[2] is due the division into the two groups Ectoprocta and Entoprocta, the latter containing only the two singular genera Pedicellina and Loxosoma. Allman[3] formed the orders Phylactolæmata and Gymnolæmata, the latter including most of the bryozoa and all forms capable of preservation as fossils. Busk's suborders Chilostomata, Cyclostomata, and Ctenostomata[4] have been generally accepted. To these suborders Mr. Ulrich, in 1882,[5] added the suborder Trepostomata, to include, besides uncontested bryozoa, a number of forms which had been generally regarded as corals; and Mr. G. R. Vine, in 1883,[6] added the suborder Cryptostomata.

Recently Dr. J. W. Gregory[7] has raised these suborders to the rank of orders, and for the Chilostomata proposes five suborders: the Stolonata, with the families Æteidæ, Eucratiidæ, and Chlidoniidæ; the Cellularina, with the families Cellulariidæ, Bicellariidæ, Epistomiidæ, Catenicellidæ, and Bifaxariidæ; the Athyriata, with the families Farciminariidæ, Flustridæ, Membraniporidæ, Cribrilinidæ, Microporidæ, Steganoporellidæ, and Cellariidæ; the Schizothyriata, with families Schizoporellidæ, Adeonellidæ, and Microporellidæ; and the Holothyriata, with the families Lepraliidæ, Celleporidæ, and Smittiidæ. For the Cyclostomata he proposes three suborders: the Articulata, with one family, the Crisiidæ; the Tubulata, with the families Tubuliporidæ, Entalophoridæ, Idmoneidæ, Horneridæ, Fascigeridæ, Osculiporidæ, and Theonoidæ; and the Dactylethrata, with the families Clausidæ and Reticuliporidæ.

Zittel, in his excellent Handbuch der Palæontologie (Leipzig, 1880), utilizing the labors of Nitsche, Allman, Busk, Smitt, Hincks, Reuss, Stoliczka, and others, gave probably as good a classification as could be given at that time. We have followed in the main the classification in the English edition of Zittel's Textbook of Palæontology (Macmillan & Co., London, 1896); the section of this edition relating to the bryozoa was revised and in large part rewritten by Mr. E. O. Ulrich. Departures from this classification are based mainly upon later, hitherto unpublished, studies of this author.

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[1] Pal. Franc. Terr. Crétacé, V, 1850-1.

[2] Zeitschrift für wissenschaftliche Zoologie, XX, 1869.

[3] Monograph of the Freshwater Polyzoa, 1856, p. 10.

[4] British Museum Catalogue of Marine Polyzoa, 1852.

[5] Jour. Cincinnati Soc. Nat. Hist., V, p. 151.

[6] Rept. Brit. Assoc. Adv. Sci., p. 196.

[7] Trans. Zool. Soc. London, XIII, 1893, and British Museum Catalogue of Jurassic Bryozoa, 1896.

While there is general agreement as to the suborders and higher groups, confusion reigns in the arrangement of the genera into families, more especially of the post-Paleozoic forms. This is due in large measure to the fact that the importance of the various structural features is very differently rated. Formerly most writers considered zoarial features of chiefest importance for family and generic groupings, but of late there has come substantial agreement that zoœcial features far outweigh zoarial characters for classificatory purposes. But as to the relative importance of the various zoœcial characters there is no agreement. A great deal of study is still required, especially to determine the relationship of Paleozoic to later forms, before the principles of classification applicable to this class shall be so well established that a classification can be made which will be correct phylogenetically.

OUTLINE OF CLASSIFICATION.

The subordination of the larger groupings of the bryozoa is shown in the tabular form following:

- Subkingdom MOLLUSCOIDEA.
  - Class BRYOZOA Ehrenberg.
    - Group ECTOPROCTA Nitsche.
      - Order GYMNOLAEMATA Allman.
        - Suborder I. CTENOSTOMATA Busk.
        - Suborder II. CYCLOSTOMATA Busk.
        - Suborder III. TREPOSTOMATA Ulrich.
        - Suborder IV. CRYPTOSTOMATA Vine.
        - Suborder V. CHILOSTOMATA Busk.
    - Group ENTOPROCTA Nitsche.
      - Order PEDICELLINEA Hincks.
  - Subclass RHABDOPLEURAE Gill.
    - Order PODOSTOMATA Lankester.

SCHEME OF CLASSIFICATION OF PALEOZOIC BRYOZOA.

Subkingdom MOLLUSCOIDEA.

Class BRYOZOA Ehrenberg.

Group ECTOPROCTA Nitsche.

Order GYMNOLÆMATA Allman.

Suborder CTENOSTOMATA Busk.

Family Rhopalonariidæ.

Rhopalonaria Ulrich.

Family Ascodictyonidæ Ulrich.

Ascodictyon Nicholson and Etheridge, Jun., Vinella Ulrich.

Suborder CYCLOSTOMATA Busk.

Family Diastoporidæ Busk (emend. Ulrich).

Stomatopora Bronn, Proboscina Audouin, Berenicea Lamouroux, Diastoporina Ulrich, ? Hederella Hall, ? Hernodia Hall, ? Reptaria Rolle.

Family Idmoneidæ Busk.

Crisinella Hall, Protocrisina Ulrich.

Family Entalophoridæ Reuss.

Mitoclema Ulrich, Clonopora Hall, Diploclema Ulrich, ? Cystopora Hall.

Family Phaceloporidæ Ulrich.

Phacelopora Ulrich.

Family Ceramoporidæ Ulrich.

Ceramopora Hall, Ceramoporella Ulrich, Crepipora Ulrich, Chiloporella Ulrich, Cœloclema Ulrich, Anolotichia Ulrich, Ceramophylla Ulrich, Bythotrypa Ulrich, Scenellopora Ulrich, Spatiopora Ulrich.

Family Fistuliporidæ Ulrich.

Fistulipora McCoy, Cyclotrypa Ulrich, Eridopora Ulrich, Hexagonella Waagen and Wentzel, Pinacotrypa Ulrich, Chilotrypa Ulrich, Strotopora Ulrich, Meekopora Ulrich, Lichenotrypa Ulrich, Buskopora Ulrich, Glossotrypa Hall, Selenopora Hall, Favicella Hall, Cœlocaulis Hall.

Family Botrylloporidæ.

Botryllopora Nicholson.

Suborder TREPOSTOMATA Ulrich.

Family Monticuliporidæ Nicholson (emend. Ulrich).

Monticulipora D'Orbigny, Atactoporella Ulrich, Peronopora Nicholson, Homotrypella Ulrich, Homotrypa Ulrich, Prasopora Nicholson and Etheridge, Jun., Aspidopora Ulrich, Mesotrypa Ulrich.

Family Amplexoporidæ Ulrich.

Amplexopora Ulrich, Monotrypella Ulrich, Petalotrypa Ulrich, Discotrypa Ulrich.

Family Heterotrypidæ Ulrich.

Heterotrypa Nicholson, Dekayella Ulrich, Dekayia Milne Edwards and Haime, Petigopora Ulrich, Leptotrypa Ulrich, Atactopora Ulrich.

Family Batostomellidæ Ulrich.

Batostomella Ulrich, Bythopora Miller and Dyer, Callotrypa Hall, Trematella Hall, Eridotrypa Ulrich, Stenopora Lonsdale, Anisotrypa Ulrich, Lioclema Ulrich, Lioclemella Foerste, ? Thallostigma Hall.

Family Constellariidæ Ulrich.

Constellaria Dana, Stellipora Hall, Nicholsonella Ulrich, Idiotrypa Ulrich, ? Dittopora Dybowski.

Family Trematoporidæ Ulrich.

Trematopora Hall, Batostoma Ulrich, Hemiphragma Ulrich, Stromatotrypa Ulrich, Monotrypa Nicholson, Diplotrypa Nicholson (emend. Ulrich).

Family Calloporidæ Ulrich.

Callopora Hall (emend. Ulrich), ? Calloporella Ulrich.

Suborder CRYPTOSTOMATA Vine.

Family Phylloporinidæ Ulrich.

Phylloporina Ulrich, Drymotrypa Ulrich.

Family Fenestellidæ King.

Fenestella Lonsdale, Semicoscinium Prout, Fenestrapora Hall, Isotrypa Hall, Loculipora Hall, Unitrypa Hall, Hemitrypa Phillips, Helicopora Claypole, Archimedes Owen, Polypora McCoy, Lyropora Hall, Fenestralia Prout, Thamniscus King, Phyllopora King, Reteporidra, Reteporina D'Orbigny, Ptiloporella Hall, Ptiloporina Hall.

Family Acarthocladiidæ Zittel.

Pinnatopora Vine, Acanthocladia King, Septopora Prout, Synocladia King, Ptilopora McCoy, Ichthyorachis McCoy, Diploporaria, ? Ramipora Toula.

Family Sphragioporidæ Ulrich.

Sphragiopora Ulrich.

Family Arthrostylidæ Ulrich.

Arthrostylus Ulrich, Helopora Hall, Arthroclema Billings, Sceptropora Ulrich, Nematopora Ulrich.

Family Rhabdomesontidæ Vine.

Rhombopora Meek, Rhabdomeson Young and Young, Cœloconus Ulrich, Bactropora Hall, Orthopora Hall, Acanthoclema Hall, Nemataxis Hall, ? Tropidopora Hall, ? Streblotrypa Ulrich, ? Hyphasmopora Etheridge, Jun.

Family Chainodictyonidæ.

Chainodictyon Foerste.

Family Ptilodictyonidæ Ulrich.

Ptilodictya Lonsdale, Escharopora Hall, Clathropora Hall, Phænopora Hall, Arthropora Ulrich, Graptodictya Ulrich, Stictoporina Hall.

Family Stictoporellidæ.

Stictoporella Ulrich, Ptilotrypa Ulrich, Intrapora Hall, Coscinella Hall, Tæniodictya Ulrich, Stictopora Hall, Heliotrypa Ulrich.

Family Rhinidictyonidæ Ulrich.

Rhinidictya Ulrich, Eurydictya Ulrich, Pachydictya Ulrich, Phyllodictya Ulrich, Euspilopora Ulrich, Dicranopora Ulrich, Goniotrypa Ulrich, Trigonodictya Ulrich.

Family Cystodictyonidæ Ulrich.

Cystodictya Ulrich, Dichotrypa Ulrich, Coscinium Keyserling, Tæniopora Nicholson, Thamnotrypa Hall, Semiopora Hall, Ptilocella Simpson, Acrogenia Hall, Prismopora Hall, Scalaripora Hall, Glyptopora Ulrich, Phractopora Hall, Ceramella Hall, Evactinopora Meek and Worthen, ? Goniocladia Etheridge, Jun.

Family Actinotrypidæ Ulrich.

Actinotrypa Ulrich.

Family Cycloporidæ.

Cyclopora Prout, Cycloporella Ulrich, Proutella Ulrich,Worthenopora Ulrich.

Family Rhinoporidæ Ulrich.

Rhinopora Hall, Diamesopora Hall, Lichenalia Hall, Stictotrypa Ulrich.

Suborder CHILOSTOMATA Busk.

Family Paleschariḍæ Ulrich.

Paleschara Hall.

TERMINOLOGY.

ZOARIUM (polyzoarium, cœnœcium).—The composite structure formed by repeated gemmation. The form which results is very variable, though usually fairly constant for each species. Gemmation in a plane produces *unilaminar* sheets which are often *parasitic* (incrusting) upon other organisms, but are sometimes free; in the latter case the protecting covering on the under side is the *epitheca*. Hollow branches lined with an epitheca are a special form of this mode of gemmation. Two unilaminar sheets growing erect, back to back, form a *bilaminar* or *bifoliate* expansion or *frond*. The epithecæ of the two layers of zoœcia thus brought together form a *mesotheca* (mesial or medial laminæ). The small pores seen in the mesotheca, or between the walls of adjoining zoœcia of certain species when thin sections of well-preserved specimens are examined under the microscope, have received the name *median tubuli* (Ulrich).

When gemmation takes places on any side of the zoœcium, *massy* forms result, which may be hemispherical, globular, or discoidal in shape. Gemmation in a particular direction will produce *ramose* or *dendroid* forms.

Among the Fenestellidæ and related families a network is formed. The openings in the network are *fenestrules;* bars connecting the branches are *dissepiments*. The surface upon which the zoœcia open is the *obverse*, the other the *reverse*.

MONTICULES and MACULÆ.—It is quite common, especially in the Trepostomata, for some clusters of zoœcia to outstrip the surrounding zoœcia in growth and tower above them. The rounded elevations thus formed are termed *monticules*. Sometimes the clusters consist of mesopores instead of zoœcia, surrounded by a zone of larger zoœcia. In the latter case the clusters of mesopores may not be elevated above the general level, but may be even depressed below it. Such clusters are called *maculæ*.

ZOŒCIUM (cell).—The cavity with its bounding wall inhabited by the animal. The wall is constructed of laminated tissue. In particularly well-preserved specimens, thin sections reveal very small tubular passages penetrating the walls of adjoining zoœcia. To these Ulrich has applied the term *communication pores*.

In some forms, especially among the Trepostomata, the zoœcia have the form of elongated tubes, which are crossed by partitions termed *diaphragms*. The opening upon the surface of the zoœcium or of the vestibule among the Cryptostomata is the *aperture*. It is often closed by a *zoœcial cover* (closure or operculum).

One side of the zoœcial cavity in some of the Trepostomata is lined with a series of superimposed vesicles, the *cystiphragms* (cystoid diaphragms); their purpose or use is unknown.

Among the Cryptostomata plates frequently project from the walls into the cavity; that upon the posterior wall of the zoœcium is the *superior hemiseptum* (Ulrich), that upon the anterior wall is the *inferior hemiseptum*. The opening of the zoœcium among the Cryptostomata is the *orifice;* the tubular shaft which is left above the orifice as the surface of the zoarium is thickened by strengthening or protective tissue in the *vestibule*.

INTERSPACE.—The part of the surface of the zoarium between the apertures of the zoœcia.

Mesopores (interstitial cells).—Tubular structures found between the zoœcia; they are commonly angular or irregular in outline in cross section.

Acanthopores (spiniform corallites, spiniform tubuli).—Small cylindrical tubes usually situated at the angles of junction of adjoining zoœcia, forming spine-like projections upon the surface.

Vesicular Tissue.—In a number of forms the space between the zoœcia is occupied by tissue composed of irregularly superimposed vesicles. This probably served to give strength to the zoarium and to protect the zoœcia.

DIAGNOSES OF SUBORDERS, FAMILIES, AND GENERA.

Class BRYOZOA Ehrenberg.

Order GYMNOLÆMATA Allman.

Suborder CTENOSTOMATA Busk.

Zoœcia usually isolated and developed by budding from the internodes of a distinct tubular stolon or stem. Orifice terminal, with an operculum of setæ. Zoarium horny or membranaceous. Marsupia wanting.

Family RHOPALONARIIDÆ.

Rhopalonaria Ulrich.

Fusiform segments (? stolons constricted fusiformly) arranged in a more or less pinnate manner, impressed or almost embedded in the host. Zoœcia unknown.

Genotype and only described species: *Rhopalonaria venosa* Ulrich. Range, Ordovician–Devonian. A species very similar to the genotype occurs in the Clinton, and another undescribed species is found in the Hamilton.

Family ASCODICTYONIDÆ Ulrich.

Ascodictyon Nicholson and Etheridge, Jun.

Zoarium parasitic, of thread-like ramifying stolons, with bulbous enlargements, arranged irregularly or in stelliform clusters; surface minutely punctate. Zoœcia unknown.

Genotype: *Ascodictyon stellatum* Nicholson and Etheridge, Jun. Devonian. Two described species; also several undescribed species from the Chester group.

Vinella Ulrich.

Zoarium parasitic, consisting of exceedingly slender, ramifying, thread-like, tubular stolons, arranged more or less distinctly in a radial manner. Surface of stolons sometimes faintly lined longitudinally and with a row of widely separated small pores along the top. Zoœcia unknown.

Genotype: *Vinella repens* Ulrich. Three described and five new species, ranging from Ordovician to Mississippian.

Suborder CYCLOSTOMATA Busk.

Zoœcia simple, tubular; walls thin, minutely porous; apertures plain, inoperculate, commonly raised; interspaces with or without strengthening tissue; marsupia and appendicular organs wanting; oœcium a large modified cell or an inflation of the zoarial surface.

Family DIASTOPORIDÆ Busk (emend. Ulrich).

Zoarium adnate or erect, the latter unilaminate, bilaminate, or forming hollow stems; zoœcia generally tubular; apertures salient, usually narrower than the width of the zoœcium, never clustered; interstitial cells wanting; ovicells mere inflations of the surface, with one or more openings.

STOMATOPORA Bronn (ALECTO Lamouroux, not Leach).

Zoarium adnate, branching dichotomously; zoœcia subtubular or subpyriform, arranged typically in a single linear series; apertures subterminal.

Genotype: *Stomatopora dichotoma* Lamouroux. Range, Ordovician–Devonian; Jurassic–Recent. Nine described and eight new Paleozoic species, mostly from the Ordovician.

PROBOSCINA Audouin.

Zoarium adnate, multiserial, rarely widening into a sheet; zoœcia tubular; apertures subterminal.

Genotype: *Proboscina boryi* Audouin. Range, Ordovician–Devonian; Jurassic–Recent. Five described and two new species in American Paleozoic strata, mostly Ordovician.

BERENICEA Lamouroux (DIASTOPORA of authors, not Lamouroux, SAGENELLA Hall, ROSACILLA Roemer, DIASTOPORELLA Vine).

Zoarium adnate, forming thin, discoid, flabellate, or irregular crusts; zoœcia tubular, arranged in irregularly alternating lines.

Genotype: *Berenicea diluviana* Lamouroux. Range, Ordovician, Silurian, Jurassic–Recent. Six described and several new species in American Paleozoic strata, mainly Ordovician.

DIASTOPORINA Ulrich.

Zoarium bifoliate; zoœcia subtubular, prostrate, immersed; apertures subcircular, not prominent; zoarial surface between apertures finely puncto-striate.

Genotype and only known species: *Diastoporina flabellata* Ulrich. Ordovician.

The systematic position of the following genera, placed provisionally in this family, is uncertain.

HEDERELLA Hall (NICHOLSONIA Davis).

Zoarium adnate, consisting of a tubular axis, from which the zoœcia bend off alternately to left and right; zoœcia annulated and striated transversely and finely striated longitudinally; apertures terminal, equaling in width the diameter of the zoœcia.

Genotype: *Alecto canadensis* Nicholson. Devonian. Six species.

HERNODIA Hall.

Zoarium adnate, consisting of linear series of elongated, annulated zoœcia, budded from the sides of preceding zoœcia; apertures terminal, equaling in width the diameter of the zoœcia.

Genotype and only known species: *Hernodia humifusa* Hall. Devonian.

REPTARIA Rolle (PTILIONELLA Hall).

Zoarium adnate, consisting of cylindrical, annulated zoœcia in contact but not coalescing along their sides, and proceeding in the plane of their host laterally outward from a median line and then upward; apertures terminal, equaling in width the diameter of the zoœcia.

Genotype: *Reptaria stolonifera* Rolle. Devonian. Two species

Family IDMONEIDÆ Busk.

Zoarium of free or adnate subcylindrical or subprismatic branches; zoœcial apertures rounded, more or less elevated, usually arranged in transverse rows on two faces of branches, these two faces sometimes being confluent; dorsal surface of branches without zoœcia; small tubular pores may open on either surface of the branches, but more frequently on the dorsal.

CRISINELLA Hall.

Zoarium ramose, solid; celluliferous on one face; apertures arranged in rows, alternately arranged, ascending obliquely from the middle to the margins of the branch; peristomes prominent.

Genotype and only known species: *Crisina ? scrobiculata* Hall. Devonian.

PROTOCRISINA Ulrich.

Zoarium consisting of narrow, bifurcating branches, celluliferous on one face only; zoœcia subtubular, with prominent, circular apertures arranged in intersecting diagonal series; on both faces small pores irregularly distributed.

Genotype and only known species: *Protocrisina exigua* Ulrich. Ordovician.

Family ENTALOPHORIDÆ Reuss.

Zoarium ramose, branches free, subcylindrical, with rounded and more or less prominently exserted zoœcial apertures opening on all sides of the branches.

MITOCLEMA Ulrich.

Zoarium ramose, cylindrical, consisting of long tubular zoœcia, which are thin-walled and prismatic in the axial region, diverge gradually from the center, and bend abruptly outward near the surface, often becoming free and much exserted; apertures terminal, circular, usually arranged in regular transverse or subspiral series.

Genotype: *Mitoclema cinctosum* Ulrich. Ordovician. Two described and one new species.

CLONOPORA Hall.

Zoarium ramose; branches cylindrical, consisting of elongate tubular zoœcia, cohering for part of their length, then bending outward and becoming free; apertures terminal, not contracted, arranged in rings or spirally around the branch.

Genotype: *Clonopora semireducta* Hall. Devonian. Three species.

DIPLOCLEMA Ulrich.

Zoarium dendroid, branches slightly compressed, spreading in the same plane; zoœcia tubular, diverging from a wavy mesial mesotheca; apertures circular; prominent.

Genotype: *Diploclema trentonense* Ulrich. Ordovician, Silurian. Two species.

CYSTOPORA Hall.

Zoarium cylindrical, consisting of tubular, ampullate zoœcia, cohering for the greater part of their length; distally the zoœcia bend outward, becoming free and much contracted; apertures terminal.

Genotype and only known species: *Cystopora geniculata* Hall. Devonian.

Family PHACELOPORIDÆ Ulrich.

PHACELOPORA Ulrich.

Zoarium articulated; zoœcia conical, two or more aggregated to form cone-shaped bundles; apertures subterminal, circular, and slightly contracted.

Genotype and only described valid species: *Phacelopora pertenuis* Ulrich. Ordovician. One new species in the Clinton group.

Family CERAMOPORIDÆ Ulrich.

Zoarium variable; maculæ or clusters of mesopores or of zoœcia larger than usual at regular intervals; zoœcia tubular, at first prostrate, continue obliquely or directly to the surface, often with a few diaphragms; apertures commonly oblique, provided with a lunarium; mesopores generally present, always irregular and usually without diaphragms; walls minutely porous, formed of intimately connected and irregularly laminated tissue.

CERAMOPORA Hall.

Zoarium discoidal, free or attached by the center of the base; under surface with one or more layers of small, irregular cells; zoœcia radiating out on the upper surface from a depressed center; apertures oblique, imbricating; mesopores short, irregular, decreasing in number from center to margin.

Genotype: *Ceramopora imbricata* Hall. Silurian.

CERAMOPORELLA Ulrich.

Zoarium of incrusting layers, which by superposition may form masses; zoœcia short, tubular with thin walls; apertures oval, oblique, the lunarium forming a hood; mesopores abundant, often completely encircling the zoœcia.

Genotype: *Ceramoporella distincta* Ulrich. Ordovician. Nine described and twenty new species.

CREPIPORA Ulrich.

Zoarium incrusting, lamellate or massive, or, in one species, forming hollow branches; zoœcia long, tubular, thin-walled, with diaphragms; apertures angular or subpyriform, lunarium not overarching, its ends usually projecting; mesopores generally restricted to the maculæ, which are elevated or depressed.

Genotype: *Crepipora simulans* Ulrich. Ordovician. Eight described and six new species.

CHILOPORELLA Ulrich.

Zoarium forming parasitic sheets, from which rise flabellate fronds or compressed branches; zoœcial tubes long, thin-walled, irregular in shape in immature region, near the surface walls much thickened, diaphragms rarely developed; apertures ovate, lunarium conspicuously elevated; mesopores numerous.

Genotype and only described species: *Fistulipora ? flabellata* Ulrich = *Ceramopora nicholsoni* James. Ordovician.

CŒLOCLEMA Ulrich.

Zoarium forming hollow branches, lined internally with a striated epitheca; zoœcia as in Ceramoporella, but with thicker walls.

Genotype: *Diamesopora vaupeli* Ulrich = *Ceramopora alternata* James. Ordovician. Four described and three new species.

ANOLOTICHIA Ulrich.

Zoarium ramose, digitate, laminate, or incrusting; zoœcial tubes long, subpolygonal, intersected by remote diaphragms; lunarium elevated at the surface, traversed by two to six minute, vertical, closely tabulated tubes; mesopores sparingly developed.

Genotype: *Anolotichia ponderosa* Ulrich. Ordovician. Two described and three new species.

CERAMOPHYLLA Ulrich.

Zoarium erect, bifoliate, the two layers grown together back to back; in other respects like Ceramoporella and Cœloclema.

Genotype and only known species: *Ceramophylla frondosa* Ulrich. Ordovician.

BYTHOTRYPA Ulrich.

Zoarium massive or lamellate; zoœcial tubes long, intersected by thin diaphragms; apertures subovate, nearly direct, lunarium large, well-raised; mesopores numerous, open at the surface, forming internally a very loose vesicular tissue.

Genotype: *Fistulipora ? laxata* Ulrich. Ordovician. Two species.

SCENELLOPORA Ulrich.

Zoarium simple, pedunculate, under surface epithecated; upper surface slightly concave and celluliferous; zoœcial apertures occupy the summits of low ridges radiating from the center.

Genotype and only known species: *Scenellopora radiata* Ulrich. Ordovician.

SPATIOPORA Ulrich.

Zoarium forming thin crusts, usually on Orthoceras; zoœcia very short, nearly direct; apertures irregular, with blunt spines at the angles, no lunarium developed; elevated, elongated maculæ usually a conspicuous feature.

Genotype: *Spatiopora aspera* Ulrich. Ordovician. Ten described and seven new species.

Family FISTULIPORIDÆ Ulrich.

Zoarium massive, lamellate or ramose, showing on the surface at irregular intervals maculæ or monticules composed of clusters of vesicles and of zooecia slightly larger than the average; lunarium generally well developed, sometimes wanting; zooecial tubes cylindrical or somewhat compressed, thin-walled, with diaphragms; walls minutely porous; apertures usually direct, closed at times by perforated covers; vesicular tissue occupies the interzooecial space.

FISTULIPORA McCoy (LICHENALIA Hall, in part, DIDYMOPORA Ulrich, DYBOWSKIA and DYBOWSKIELLA Waagen and Wentzel, FISTULIPORELLA Simpson).

Zoarium massive, lamellate, ramose, parasitic or free; under surface with a wrinkled epitheca; zooecia cylindrical or somewhat compressed, direct or almost so, thin-walled until near the surface, and provided usually with a few diaphragms, and encircled by one or more series of vesicles; apertures subradially arranged about the maculæ, ovoid, subtriangular or pyriform, the lunarium more or less strongly developed; surface between apertures smooth or granular.

Genotype: *Fistulipora minor* McCoy = *Calamopora incrustans* Phillips. Range, Silurian–Carboniferous. Sixty-two described and a considerable number of new species.

CYCLOTRYPA Ulrich.

Like Fistulipora, but the lunarium obsolete and the zooecial tubes circular in cross section.

Genotype: *Fistulipora communis* Ulrich. Devonian. Two species. Future work may disclose new species and show that species now referred elsewhere belong here.

ERIDOPORA Ulrich (PILEOTRYPA Hall).

Zoarium a thin, parasitic sheet; apertures oblique, subtriangular or ovoid; lunarium very prominent, overarching.

Genotype: *Eridopora macrostoma* Ulrich. Devonian, Mississippian. Four species described and several awaiting description.

HEXAGONELLA Waagen and Wentzel.

Zoarium as in Fistulipora, but the surface is marked off into generally hexagonal spaces, which are divided from each other by more or less elevated ridges, and usually have a macula in the center of the inclosed space.

Genotype: *Hexagonella ramosa* Waagen and Wentzel. From the Carboniferous of India. Two undescribed species from the Hamilton and Warsaw.

PINACOTRYPA Ulrich (FISTULIPORINA Simpson, FISTULICELLA Simpson).

Zoarium usually a thin contorted expansion, with a wrinkled epitheca on the basal surface; zooecia thin-walled, with a few diaphragms;

interspaces wide, occupied by a single series of large angular mesopores with numerous diaphragms and never presenting the appearance of vesicular tissue; apertures subcircular, with a well-developed granose peristome, but no lunarium.

Genotype: *Fistulipora elegans* Rominger. Devonian.

CHILOTRYPA Ulrich.

Zoarium small, ramose, with a narrow, irregularly contracting and expanding axial tube; diaphragms few or absent; apertures elliptical, oblique, the lower margin thickened and elevated; interstitial vesicles commonly filled by a dense calcareous deposit near the surface.

Genotype: *Chilotrypa hispida* Ulrich. Range, Silurian–Mississippian. Eight described and five new species.

STROTOPORA Ulrich.

Zoarium ramose, with irregular branches. Like Fistulipora, but the surface presents distributed among the apertures large, abruptly spreading cells (regarded as broken ovicells); when perfectly preserved these appear as strongly convex elevations with a small opening on one side.

Genotype: *Strotopora foveolata* Ulrich. Devonian, Mississippian. Three species.

MEEKOPORA Ulrich.

Zoarium bifoliate, sometimes branching; the mesotheca thin and flexuous; zoœcia tubular, proceeding in a gentle curve from the mesotheca and opening somewhat obliquely upon the surface and provided with numerous, often recurved, diaphragms; apertures oblique, all pointing distally; lunarium, when present, not very prominent; rather large ovicells developed, showing at the surface as a convex space with a small apical opening.

Genotype: *Meekopora eximia* Ulrich. Range, Silurian–Carboniferous. Six described and three new species.

LICHENOTRYPA Ulrich.

Zoarium thin, incrusting; in its first stages like Fistulipora; as it matures, large spines and thin walls are thrown up about the apertures; numerous subangular vesicular openings interspersed among the apertures and scarcely distinguishable from them.

Genotype and only known species: *Lichenotrypa cavernosa* Ulrich = *Lichenalia longispina* Hall. Devonian.

BUSKOPORA Ulrich (ODONTOTRYPA Hall).

Like Fistulipora, but lunarium remarkably developed, projecting as a strong, bidenticulate process nearly half way across the aperture.

Genotype: *Buskopora dentata* Ulrich. Devonian. Four species.

GLOSSOTRYPA Hall.

Zoarium tubular, cylindrical, hollow; diameter of tube 2 mm.; thickness of zoarium 0.40 mm. Cells tubular, with frequent narrow projections (semidiaphragms) from the cell walls extending partially across the tube; two pseudosepta on one side; cell apertures paliform, very closely disposed, frequently in diagonally intersecting rows, the surface presenting a reticulated appearance; apertures with denticulated lunarium; interapertural space elevated, forming ridges; frequently a prominent node at the intersection of the ridges, sometimes a depression or pit; surface with monticules which are laterally in contact, giving to the frond an annulated appearance; intercellular space vesiculose.[1]

We interpret the foregoing description to mean that the genus is like *Buskopora*, save that the lunarium is developed interruptedly in the zoœcial tubes.

Genotype and only known species: *Lichenalia paliformis* Hall. Devonian.

SELENOPORA Hall.

Zoarium incrusting; surface with circular maculæ surrounded by large apertures; zoœcia tubular, oblique, surrounded by vesicular tissue; apertures subcircular, with overarching lunarium and situated in polygonal, vestibular areas formed by coalescing ridges traversing the interspaces.

Genotype: *Lichenalia circincta* Hall. Devonian. Two species.

FAVICELLA Hall (FISTULIPORIDRA Simpson).

Zoarium lamellate, free or incrusting; surface with monticules surrounded by slightly larger apertures; zoœcia tubular, cylindrical, at first prostrate and thin-walled, then bending rather abruptly and proceeding almost direct to the surface, surrounded by regularly superposed vesicles having the appearance of tabulated mesopores; apertures circular, with equally elevated peristome, but no lunarium, situated in polygonal vestibular areas formed by coalescing angular ridges traversing the interspaces; vestibular area surrounding the apertures occupied by minute angular pits.

Genotype: *Thallostigma inclusa* Hall. Devonian. Two species.

COELOCAULIS Hall.

Zoarium ramose, hollow, inner surface a thin epitheca with transverse wrinkles, and fine longitudinal striations; cells tubular, arising from the epitheca and parallel with it for a short distance, then turning abruptly outward; apertures circular or oval, sometimes irregularly disposed, at other times in a more or less regular quincunx order; peristomes thin, distinctly and equally elevated, usually smooth, but sometimes with numerous nodes or spinules; intercellular space occupied by irregularly disposed vesicles, or by regularly superimposed vesicles, resembling tabulate mesopores; interapertural space occupied by minute angular pits.[2]

Genotype: *Callopora venusta* Hall. Silurian, Devonian. Three species.

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[1] Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 562.

[2] Ibid., p. 554.

Family BOTRYLLOPORIDÆ.

BOTRYLLOPORA Nicholson.

Zoarium of small, circular, parasitic disks which commonly coalesce, developing along the line of coalescence unusually large vesicles; surface marked by ridges radiating from the depressed center and increasing in number by bifurcation toward the margin; zoœcial tubes occupying the ridges, traversed by occasional diaphragms; depressed space between ridges occupied by vesicles, presenting a solid interspace; apertures in two rows on the ridges, circular or oval, with no lunarium.

Genotype and only known species: *Botryllopora socialis* Nicholson. Devonian.

Suborder TREPOSTOMATA Ulrich.

Zoœcia prismatic or cylindrical, coherent tubes clearly separable into two regions, an axial or immature, in which the diaphragms are remote and the walls thin and prismatic, and a thickened peripheral or mature, in which the walls are thickened and otherwise changed, diaphragms are more abundant, and accessory features, such as mesopores and acanthopores, are often developed; zoœcial covers, with a small central orifice, present at times, though probably not developed in all the families; monticules or maculæ a characteristic feature of the surface.

Family MONTICULIPORIDÆ Nicholson (emend. Ulrich).

Zoarium variable; zoœcia with cystiphragms in the mature region always; apertures polygonal, rounded or irregularly petaloid; mesopores generally present, angular, with numerous diaphragms; acanthopores abundant, usually small.

MONTICULIPORA D'Orbigny.

Zoarium massy, lobate or lamellate, incrusting or free; monticules usually present; zoœcia prismatic, usually thin-walled, with cystiphragms both in mature and immature regions; apertures polygonal; mesopores few or wanting; acanthopores small, generally numerous.

Genotype: *Monticulipora mammulata* D'Orbigny. Ordovician, ? Devonian. Sixteen described and sixteen new species.

ATACTOPORELLA Ulrich.

Zoarium generally incrusting, sometimes lobate or subramose; zoœcia with very thin, inflected walls; apertures irregularly petaloid; mesopores numerous, frequently isolating the zoœcia, largely filled by a secondary deposit; acanthopores very numerous.

Genotype: *Atactoporella typicalis* Ulrich. Ordovician. Eleven described and three new species.

PERONOPORA Nicholson.

Zoarium bifoliate, through branching of the fronds often forming convoluted masses; surface smooth, usually with maculæ; zoœcia with rather thick walls, ring-like in transverse section, not inflected by the acanthopores; cystiphragms abundant; apertures circular or subpolygonal; mesopores and acanthopores variable in number.

Genotype: *Monticulipora frondosa* Nicholson (not D'Orbigny) = *Chætetes decipiens* Rominger. Ordovician. Two described and two new species.

HOMOTRYPELLA Ulrich.

Zoarium irregularly ramose or laminar; surface smooth, with small maculæ; zoœcia rather thin-walled, cystiphragms usually confined to the earlier part of the mature region and never present in the axial region; apertures subcircular, sometimes faintly petaloid; mesopores abundant, more or less completely separating the zoœcia; acanthopores numerous.

Genotype: *Homotrypella instabilis* Ulrich. Ordovician, Silurian. Eight described and five new species.

HOMOTRYPA Ulrich.

Zoarium frondescent or ramose; maculæ or monticules of larger cell apertures a characteristic feature; apertures often oblique; zoœcia with very thin or finely crenulated walls and remote diaphragms in immature region and cystiphragms, isolated or in series, confined to mature region; mesopores few, in clusters; acanthopores generally developed.

Genotype: *Homotrypa curvata* Ulrich. Ordovician, Silurian. Eighteen described and thirty new species.

PRASOPORA Nicholson and Etheridge, Jun.

Zoarium massy, usually free, with wrinkled epitheca on the under surface; zoœcia prismatic or cylindrical, thin-walled, with cystiphragms, and generally surrounded by angular mesopores; acanthopores sometimes present, but rarely numerous or strong; diaphragms crowded in mesopores.

Genotype: *Prasopora grayæ* Nicholson and Etheridge, Jun. Ordovician. Fourteen described and six new species.

ASPIDOPORA Ulrich.

Zoarium a thin expansion, sometimes of superposed layers, usually free, with epitheca on under side; typically composed, according to age, of from one to many subequal parts, each gently convex, with the zoœcia diminishing in size from center to margin; diaphragms wanting; cystiphragms few in the zoœcia; mesopores numerous, with close diaphragms; acanthopores usually present, always small.

Genotype: *Aspidopora areolata* Ulrich. Ordovician, Silurian. Eight described and four new species.

MESOTRYPA Ulrich.

Zoarium hemispheric, conical, or discoidal, generally free, with an epitheca on the under surface; zoœcia prismatic or cylindrical, with oblique and sometimes funnel-shaped diaphragms, which are probably modified cystiphragms; zoœcia more or less separated by angular mesopores, which become smaller with age, and are intersected by numerous diaphragms; acanthopores generally present, sometimes of large size.

Genotype: *Diplotrypa infida* Ulrich. Ordovician, Silurian. Ten described and seven new species.

Family AMPLEXOPORIDÆ Ulrich.

Zoarium usually ramose or discoidal, rarely bifoliate; zoœcia simple, prismatic tubes, with a well-marked divisional line (seen in tangential sections as a fine black line) between adjoining tubes; diaphragms present; mesopores practically absent, but small abortive cells sometimes occur among the larger ones in the monticules; acanthopores generally abundant, but may be wanting.

AMPLEXOPORA Ulrich.

Zoarium ramose, discoidal, or massy; zoœcia prismatic, with diaphragms; acanthopores always present, variable in size and number.

Genotype: *Amplexopora cingulata* Ulrich. Ordovician. Eight described and four new species.

MONOTRYPELLA Ulrich.

Like Amplexopora, but distinguished by the absence of acanthopores.

Genotype: *Monotrypella æqualis* Ulrich. Range, Ordovician–Devonian. Nine species.

PETALOTRYPA Ulrich.

Zoarium bifoliate, of irregular compressed branches or simple fronds; zoœcia prismatic, arising from a strongly flexuous mesotheca; apertures subcircular or polygonal; mesopore-like interspaces that do not differ in their tabulation from the zoœcia may occur; very small acanthopores (?) occupy many of the angles of junction.

Genotype: *Petalotrypa compressa* Ulrich. Devonian. Two species.

DISCOTRYPA Ulrich.

Zoarium a thin, free, or parasitic circular expansion; surface smooth, or with low, broad monticules; zoœcia thin-walled, direct; apertures hexagonal or rhomboidal, very regular in their arrangement, decreasing in size from the centers of the monticules outward; neither mesopores nor acanthopores present.

Genotype: *Chætetes elegans* Ulrich. Ordovician, Devonian. Two species.

Family HETEROTRYPIDÆ Ulrich.

Zoarium frondescent, ramose, incrusting, or massy; zoœcia polygonal, with moderately thin walls and diaphragms; walls of adjoining zoœcia coalescent; mesopores often present; acanthopores occur, sometimes of large size.

HETEROTRYPA Nicholson.

Zoarium erect, frondescent, or ramose; zoœcia with numerous diaphragms; acanthopores small, of one kind; mesopores variable in number, generally abundant, sometimes wanting.

Genotype: *Monticulipora frondosa* D'Orbigny. Ordovician, ? Devonian. Eleven described and four new species.

DEKAYELLA Ulrich.

Zoarium ramose; zoœcia with numerous diaphragms; two sets of acanthopores, large snd small; mesopores variable in number, generally numerous.

Genotype: *Dekayella obscura* Ulrich. Ordovician. Nine described and one new species.

DEKAYIA Milne-Edwards and Haime.

Zoarium erect, ramose; zoœcia with few diaphragms; acanthopores usually large; mesopores few, or wanting.

Genotype: *Dekayia aspera* Milne-Edwards and Haime. Ordovician, ? Devonian. Six species.

PETIGOPORA Ulrich.

Zoarium forming small, circular, incrusting patches; zoœcia direct, with few or no diaphragms; acanthopores rather large, of one kind only; mesopores wanting.

Genotype: *Petigopora gregaria* Ulrich. Ordovician. Four described and one new species.

LEPTOTRYPA Ulrich.

Zoarium incrusting, often assuming cylindrical, discoidal, or other forms; zoœcial tubes polygonal, with thin walls, and few or no diaphragms; acanthopores very small, never abundant; no mesopores.

Genotype: *Leptotrypa minima* Ulrich. Ordovician, ? Silurian, ? Devonian. Sixteen described and eight new species.

ATACTOPORA Ulrich.

Zoarium forming thin, parasitic expansions, usually on species of Orthoceras; zoœcia direct, with few or no diaphragms; surface with elevated, commonly elongated, subsolid monticules; acanthopores small, very numerous, inflecting the walls, giving the apertures an indented or petaloid aspect.

Genotype: *Atactopora hirsuta* Ulrich. Ordovician. Two described and two new species.

ORBIPORA Eichwald (ORBITULITES Eichwald).

Family BATOSTOMELLIDÆ Ulrich.

Zoarium usually ramose; zoœcia with thick walls in the mature region, appearing here to be fused; diaphragms in the peripheral region often centrally perforated; acanthopores and mesopores usually present, the latter small and sometimes moniliform in shape.

BATOSTOMELLA Ulrich (GEINITZELLA Waagen and Wentzel).

Zoarium ramose, branches slender; zoœcia with few diaphragms; apertures of zoœcia small, circular or oval; interspaces rounded or canaliculate, spinulose, the acanthopores small and usually very numerous; mesopores small, with subcircular openings.

Genotype: *Batostomella spinulosa* Ulrich. Range, Silurian–Permian. Six species.

BYTHOPORA Miller and Dyer.

Zoarium ramose, branches usually slender, sometimes of considerable size; zoœcia practically without diaphragms; apertures oblique, narrowing above; interspaces canaliculate; mesopores few; acanthopores comparatively strong, rarely more than one to each zoœcium, sometimes wanting.

Genotype: *Bythopora fruticosa* Miller and Dyer = *Helopora dendrina* James. Range, Ordovician–Devonian. Ten described and five new species.

CALLOTRYPA Hall.

Zoarium ramose; apertures oval, with equally elevated peristomes and with no definite arrangement; interspaces showing the openings of the numerous mesopores by which the zoœcia are surrounded; acanthopores present.

Genotype: *Callopora macropora* Hall. Silurian, Devonian. Ten species.

TREMATELLA Hall.

Zoarium ramose; more or less conspicuously annulated; zoœcia oblique, with a few diaphragms and walls much thickened in the mature region; apertures arranged in a somewhat quincunx order, interspaces ridged, forming polygonal areas; acanthopores sometimes present.

Genotype: *Trematopora annulata* Hall. Devonian. Five species.

ERIDOTRYPA Ulrich.

Zoarium ramose, branches slender; zoœcia more or less oblique, thick-walled, and intersected by diaphragms, which are most numerous and most closely set in the earlier portion of the short mature region; mesopores sometimes numerous, sometimes few, with closely set diaphragms; acanthopores small, few, or wanting.

Genotype: *Eridotrypa mutabilis* Ulrich. Range, Ordovician–Devonian. Ten described and four new species.

STENOPORA Lonsdale (TUBULICLIDIA Lonsdale, TABULIPORA Young).

Zoarium ramose, sublobate, massy, laminar, or parasitic; surface smooth or with monticules; walls of zoœcia thickened periodically in the mature region; diaphragms sometimes very few, but in most American species abundant in the mature region and perforated centrally; mesopores never very numerous, irregularly distributed; large acanthopores at the junction angles.

Genotype: *Stenopora tasmaniensis* Lonsdale. Mississippian, Carboniferous. Seventeen described and three new species.

ANISOTRYPA Ulrich.

Zoarium ramose, branches sometimes hollow and lined by an epitheca; divisional line between adjoining zoœcia (as seen in sections) sharply defined, periodical swelling of walls more or less marked; diaphragms centrally perforated, usually numerous; interspaces generally ridge-like; neither acanthopores nor mesopores.

Genotype: *Anisotrypa symmetrica* Ulrich. Mississippian. Four species.

LIOCLEMA Ulrich.

Zoarium ramose, lamellar, subglobose or incrusting; surface frequently exhibiting distinct monticules or maculæ; zoœcia with subcircular or irregularly petaloid apertures, separated by abundant angular mesopores, which in some species are open at the surface, in others closed; diaphragms few in the zoœcia, abundant, sometimes crowded in the mesopores; acanthopores numerous and strong in the typical species, small and inconspicuous in others.

Genotype: *Callopora punctata* Hall. Range, Silurian–Mississippian. Twenty-nine described and five new species.

LIOCLEMELLA Foerste.

Zoarium cylindrical, rarely branched, pointed at the base (for articulation?); otherwise much as in Lioclema.

Genotype: *Callopora ohioensis* Foerste. Ordovician, Silurian. Six described and five new species.

THALLOSTIGMA Hall.

Family CONSTELLARIIDÆ Ulrich.

Zoarium ramose, frondescent, laminar, or incrusting; zoœcia thin-walled and prismatic in the immature region, with thicker walls and subcylindrical when mature; apertures rounded, peristomes slightly elevated; mesopores angular, abundant, commonly isolating the zoœcia, at intervals gathered into clusters, which are usually stellate, closed at the surface, the closure with numerous minute perforations; true acanthopores wanting, but granules often very abundant on the interspaces; diaphragms in both zoœcia and mesopores.

CONSTELLARIA Dana.

Zoarium growing into erect, flattened branches or fronds from a basal expansion which is attached to foreign bodies; surface with depressed stellate maculæ, the spaces between the rays elevated and occupied by two or three short rows or clusters of closely approximated apertures; mesopores aggregated into maculæ, internally with gradually crowding diaphragms.

Genotype: *Ceriopora constellata* (Van Cleve) Dana. Ordovician. Nine described and three new species.

STELLIPORA Hall.

Differs from Constellaria in its incrusting habit and in having only mesopores in the interspaces between the raised zoœcial clusters.

Genotype and only known species: *Stellipora antheloidea* Hall. Ordovician.

NICHOLSONELLA Ulrich.

Zoarium a laminar expansion, sometimes giving off flattened intertwining branches or fronds; interspaces often granose, interzoœcial spaces wide, filled with numerous mesopores, which have thicker and more numerous diaphragms than the zoœcial tubes; with age the spaces become filled up with a calcareous deposit, rendering the walls of the mesopores unrecognizable.

Genotype: *Nicholsonella ponderosa* Ulrich. Ordovician. Five described and nine new species.

IDIOTRYPA Ulrich.

Zoarium parasitic; zoœcia and mesopores alike crossed by thick diaphragms at short and regular intervals, diaphragms apparently perforated by numerous minute foramina; mesopores surround the zoœcia, numerous, irregular in shape, closed at the surface; walls with numerous minute vertical tubuli or cells.

Genotype and only known species: *Idiotrypa parasitica* Ulrich. Silurian.

DITTOPORA Dybowski.

Family TREMATOPORIDÆ Ulrich.

Zoarium ramose or incrusting; zoœcia irregular in axial region, their proximal ends with diaphragms and usually constricted where these occur; walls thickened in the mature region; lines of contact of walls of adjoining zoœcia distinct; mesopores generally abundant, usually of large size, closed at the surface; acanthopores more or less abundant; diaphragms in both zoœcia and mesopores.

TREMATOPORA Hall.

Zoarium ramose; surface smooth or with monticules; zoœcia thin-walled and with few diaphragms; apertures circular or oval, with a more or less well-marked peristome; interspaces solid; mesopores irregularly angular, often obscurely moniliform, with diaphragms at the constricted parts; acanthopores of medium or small size usually present.

Genotype: *Trematopora tuberculosa* Hall. Ordovician, Silurian. Ten species.

BATOSTOMA Ulrich.

Zoarium irregularly ramose, branches arising from a large basal expansion; zoœcia with walls that are thin in the immature region, much thickened and in sections appearing ringlike (but seldom in contact) in mature region; diaphragms present; mesopores numerous or few, irregular in size or shape; acanthopores usually of large size and abundant, sometimes few.

Genotype: *Monticulipora* (*Heterotrypa*) *implicata* Nicholson. Ordovician. Eighteen described and fifteen new species.

HEMIPHRAGMA Ulrich.

Like Batostoma, but diaphragms in mature region of zoœcia incomplete.

Genotype: *Batostoma irrasum* Ulrich. Ordovician. Five species.

STROMATOTRYPA Ulrich.

Zoarium consisting of one thin layer, or several superimposed, growing upon foreign bodies; zoœcia short, with few diaphragms, the proximal end scarcely prostrate, oval in cross section; walls thin, containing periodically constricted, bead-like tubuli (modified acanthopores?), one or more to each zoœcium; apertures oval, separated by depressed interspaces, the peristomes minutely papillose; mesopores abundant, beginning on the basal lamina, decreasing in size with age, closely tabulate, the diaphragms finely punctured, their openings rarely showing, being closed by a common dermal sheet.

Genotype and only described species: *Stromatotrypa ovata* Ulrich. Ordovician. Three new species.

MONOTRYPA Nicholson (PTYCHONEMA Hall and Simpson).

Zoarium massy, hemispherical, subglobose, or discoidal; zoœcia not distinguishable into mature and immature regions, comparatively large, prismatic, with walls thin throughout and often crinkled; diaphragms remote; neither mesopores nor acanthopores.

Genotype: *Chætetes undulatus* Nicholson. Ordovician, Silurian. Fourteen described and two new species.

DIPLOTRYPA Nicholson (emend. Ulrich).

Zoarium hemispheric, discoid, globular, or irregularly massy, generally free; zoœcia comparatively large, prismatic, with diaphragms; mesopores few to many, varying in size.

Genotype: *Favosites petropolitanus* Pander. Ordovician, Silurian. Four described and two new species.

Family CALLOPORIDÆ Ulrich.

Zoarium ramose, subfrondescent, or discoidal; zoœcia increasing in size very gradually, their proximal portion very much like mesopores; apertures subcircular, the openings of a greater or less number of mesopores interspersed among them, or polygonal, in which case the mesopores are few or wanting; no acanthopores.

CALLOPORA Hall (emend. Ulrich).

Zoarium usually ramose, the branches frequently anastomosing and forming bushy clumps; zoœcia at first prismatic, four to eight sided, gradually becoming cylindrical in most cases; at first with closely set diaphragms, then diaphragms more distant, finally in the mature region diaphragms usually closely set; apertures closed at times by perforated, often ornamented covers; mesopores more or less numerous, angular, crowded with diaphragms.

Genotype: *Callopora elegantula* Hall. Ordovician, Silurian. Twenty-three described and ten new species.

CALLOPORELLA Ulrich.

Zoarium a thin expansion, free or incrusting; surface smooth or undulated; zoœcia cylindrical, with thick walls and numerous diaphragms; apertures circular, arranged in regular intersecting series; mesopores numerous, angular, surrounding the zoœcia in one or two series; acanthopores small and few.

Genotype: *Calloporella harrisi* Ulrich = *Monticulipora* (*Heterotrypa*) *circularis* James. Ordovician. Three species.

Suborder CRYPTOSTOMATA Vine.

Zoœcia short, pyriform to oblong, quadrate or hexagonal, sometimes tubular; orifice anterior, usually circular; the upper or front side of the zoœcium strengthened by a calcareous deposit, solid or vesicular in nature, which, as it proceeds, leaves an opening above the orifice, thus producing a shaft or vestibule, which may be crossed by diaphragms or hemisepta.

Family PHYLLOPORINIDÆ Ulrich.

Zoarium branching; branches free or anastomosing, celluliferous on one side only, the other side striated; zoœcia more or less tubular, often with diaphragms; hemisepta wanting.

PHYLLOPORINA Ulrich.

Zoarium with branches irregularly anastomosing, with two to eight rows of apertures on the obverse side, on the reverse longitudinally striated; tabulated interstitial spaces generally present, closed at the surface; acanthopores often present.

Genotype: *Retepora trentonensis* Nicholson. Ordovician, Silurian. Fifteen described and four new species.

DRYMOTRYPA Ulrich (THAMNOCELLA Simpson).

Zoarium branching dichotomously at frequent intervals, on reverse longitudinally striated; zoœcia in several ranges, tubular, springing from a thin double plate, beneath which a number of vesicles (aborted zoœcia?) are present; vestibules expanding from the orifices to the angular apertures.

Genotype: *Retepora diffusa* Hall. Ordovician, Silurian. Four species.

Family FENESTELLIDÆ King.

Zoarium a reticulated expansion, celluliferous on one side only, composed of rigid branches, united by regular nonporiferous bars (dissepiments), or branches may be sinuous and anastomose at regular intervals, or may remain free; zoœcia oblong, quadrate, or hexagonal in outline, embedded in a calcareous crust which is minutely porous, especially on the noncelluliferous side; orifice anterior, semielliptical, truncated behind; apertures rounded, with peristome and closed at times by a centrally perforated closure; a superior hemiseptum generally present, an inferior one less frequently.

FENESTELLA Lonsdale (ACTINOSTOMA Young and Young, FLABELLIPORINA Simpson).

Zoarium flabellate or funnel shaped, celluliferous on the inner side; branches generally straight, sometimes flexuous, connected at regular intervals by dissepiments; apertures in two rows, separated by a plain or tuberculated median keel.

Genotype: *Gorgonia antiqua* (Goldfuss?) Lonsdale. Accepted genotype: *Fenestella plebeia* McCoy. Range, Ordovician–Carboniferous. One hundred and eleven described and a considerable number of new species.

SEMICOSCINIUM Prout (CRYPTOPORA Nicholson, CARINOPORA Nicholson, CYCLOPORINA Simpson).

Zoarium funnel shaped, celluliferous on the outer side; dissepiments wide, very short, the branches appearing to anastomose on the nonporiferous face, where the fenestrules are subrhomboidal or rounded; apertures in two rows, median keel very high and expanded at the summit.

Genotype: *Semicoscinium rhomboideum* Prout. Silurian, Devonian. Twenty-six species.

FENESTRAPORA Hall.

Zoarium as in Semicoscinium, except that the reverse of the zoarium and the expanded summits of the carinæ bear large scattered pores or pits.

Genotype: *Fenestrapora biperforata* Hall. Devonian. Three species.

ISOTRYPA Hall (TECTULIPORELLA Simpson).

Zoarium funnel-shaped, branches connected by dissepiments; apertures in two rows, separated by a carina; the carinæ prominent, expanded at the summit; summits connected by round or oval lateral bars, usually situated above the dissepiments; on the reverse face a more or less conspicuous pore occurs on or near each dissepiment. The superstructure gives the obverse much the appearance of the reverse of the zoarium.

Genotype: *Fenestella* (*Isotrypa*) *conjunctiva* Hall. Devonian. Two species.

LOCULIPORA Hall (emend.) (TECTULIPORA Hall).

Zoarium funnel-shaped, branches connected by short, typically reduced to a minimum, nonporiferous dissepiments; apertures in two rows; branches and dissepiments carinated, the carinæ coalescing; summits of carinæ much expanded, angular, and slightly carinated, their width usually equaling that of the branches and dissepiments below and hence causing difficulty in distinguishing the obverse and reverse sides.

Genotype: *Fenestella perforata* Hall. Silurian, Devonian. Four species.

UNITRYPA Hall.

Zoarium funnel-shaped; branches connected by dissepiments; apertures in two rows, separated by a carina; carinæ prominent, thickened above and connected by thin oblique subimbricating plates (scalæ), which may be as numerous as the zoœcia, or only two to each fenestrule.

Genotype: *Fenestella* (*Hemitrypa*) *lata* Hall. Silurian, Devonian. Sixteen species.

HEMITRYPA Phillips.

Zoarium as in Fenestella, but has a reticulated superstructure whose meshes correspond in number and position with the zoœcial apertures; the structure rests on pillars which rise at regular intervals from the moderate median keel of the branches.

Genotype: *Hemitrypa oculata* Phillips. Range, Silurian–Carboniferous. Sixteen species.

HELICOPORA Claypole.

Zoarium spiral, the inner edge thickened and nonporiferous, but without forming a solid axis; otherwise as in Fenestella.

Genotype: *Helicopora latispiralis* Claypole. Silurian, Devonian. Two species.

ARCHIMEDES Owen (ARCHIMEDIPORA D'Orbigny).

Zoarium a spirally wound fenestrated expansion supported by a solid calcareous, central axis; otherwise as in Fenestella.

Genotype: *Fenestella* (*Archimedes*) *wortheni* Hall. Mississippian. Sixteen species.

POLYPORA McCoy (PROTORETEPORA De Koninck, POLYPORELLA Simpson, FLABELLIPORELLA Simpson).

Zoarium as in Fenestella but has from two to eight rows of zoœcia on a branch, and lacks the median keel, though this is sometimes represented by a row of strong nodes or tubercles.

Genotype: *Polypora dendroides* McCoy. Range, Silurian–Carboniferous. Eighty-two described and other new species.

LYROPORA Hall (LYROPORELLA, LYROPORINA, LYROPORIDRA Simpson).

Zoarium flabellate, the fenestrated portion spread between the arms of a nonporiferous U or V shaped calcareous support, which is free or pedunculate at the base; zoœcia in from two to five ranges; no median keel.

Genotype: *Fenestella* (*Lyropora*) *subquadrans* Hall. Mississippian. Seven species.

FENESTRALIA Prout.

Zoarium as in Fenestella, but with four rows of apertures, two on each side of the prominent median keel.

Genotype: *Fenestralia sancti-ludovici* Prout. Mississippian. Two species.

Thamniscus King.

Zoarium as in Polypora, but branches bifurcate more frequently and are rarely or not at all connected by dissepiments.

Genotype: *Ceratophytes dubius* Schlotheim. Range, Silurian-Carboniferous. Thirteen species.

Phyllopora King.

Zoarium funnel-shaped, celluliferous on the outer face; fenestrules oval, branches anastomosing or connected by broad celluliferous dissepiments; zoœcia in two ranges normally; without median keel.

Genotype: *Gorgonia ehrenbergi* Geinitz. Devonian. One species.

Reteporidra (=Reteporella Simpson)[1] (Anastomopora Simpson).

Zoarium a flabellate or undulating expansion with thickened margins; branches sinuous or zigzag, anastomosing at short and regular intervals so as to produce a regular series of oval fenestrules; apertures in three to seven rows; branches without a median carina.

Genotype: *Retepora undulata* Simpson = *Fenestella perundata* Hall. Devonian. Three species.

Reteporina D'Orbigny.

Zoarium as in Reteporidra, but the zoœcia are in two ranges, with the apertures separated or not by a more or less well-marked median carina.

Genotype: *Retepora prisca* Goldfuss. Devonian, Mississippian. Eight species.

Ptiloporella Hall (Pinnaporella Simpson, 1897).

Zoarium a fenestrated funnel-shaped expansion; branches of two sizes, the smaller or secondary branches proceeding laterally from the larger or primary ones, either from one or both sides; as the frond expands, other large branches proceed from the primary ones, this process continuing during the growth of the frond; apertures in two rows separated by a carina; the carinæ of the primary branches more prominent than those of the secondary branches.

Genotype: *Fenestella* (*Ptiloporella*) *laticrescens* Hall. Silurian, Devonian. Four species.

Ptiloporina Hall (Pinnaporella Simpson, 1895, Pinnaporina Simpson).

Zoarium like that of Ptiloporella in mode of growth, but branches have three or more rows of apertures and no median carina.

Genotype: *Fenestella* (*Ptiloporina*) *conica* Hall. Devonian. Four species.

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[1] Reteporidra is proposed for Reteporella, preoccupied by Busk, Challenger Report, X, 1884, p. 126.

Family ACANTHOCLADIIDÆ Zittel.

Zoarium a pinnate or fenestrate expansion, celluliferous on one face only, consisting of strong central stems which give off numerous smaller, lateral branches from their margins; the lateral branches are free or unite with those of the next stem; nonporiferous dissepiments rarely present; zoœcial characters mostly as in the Fenestellidæ.

PINNATOPORA Vine (GLAUCONOME of authors).

Zoarium a small delicate stipe, with short, free lateral branches given off frequently and at regular intervals; apertures in two rows, separated by a moderate median keel.

Genotype: *Glauconome elegans* Young and Young. Range, Devonian–Carboniferous. Nineteen species.

ACANTHOCLADIA King.

Zoarium as in Pinnatopora, but larger and stronger and with three or more rows of apertures between which the surface is elevated into small longitudinal ridges or series of tubercules.

Genotype: *Ceratophytes anceps* Schlotheim. Carboniferous. One species.

SEPTOPORA Prout.

Zoarium a fenestrate, flabellate or leaf-like expansion; primary branches numerous, increasing by bifurcation or interpolation; the lateral branches unite with those from the adjacent primary branches; apertures in two rows on primary and lateral branches; reverse usually with fine striæ and scattered dimorphic pores.

Genotype: *Septopora cestriensis* Prout. Mississippian, Carboniferous. Eleven species.

SYNOCLADIA King.

Zoarium as in Septopora, but branches stronger and with three or more rows of apertures, usually between elevated ridges.

Genotype: *Retepora virgulacea* Phillips. No American species known.

PTILOPORA McCoy (DENDRICOPORA De Koninck).

Zoarium pinnate, the stipe much stronger than the oblique lateral branches, which are occasionally and irregularly united by dissepiments; apertures in two rows.

Genotype: *Ptilopora pluma* McCoy. Devonian, Mississippian. Eight species.

ICHTHYORACHIS McCoy.

Zoarium as in Ptilopora, but the stipe bears five or more rows of apertures and the branches usually three.

Genotype: *Ichthyorachis newenhami* McCoy. Silurian. One species.

DIPLOPORARIA (= DIPLOPORA Young and Young).[1]

Zoarium as in Pinnatopora, but has no lateral branchlets.

Genotype: *Diplopora marginalis* Young and Young. Mississippian, Carboniferous. Two species.

RAMIPORA Toula.

Family SPHRAGIOPORIDÆ Ulrich.

SPHRAGIOPORA Ulrich.

Zoarium parasitic, forming small, circular, subhemispheric patches on foreign bodies; zoœcia of the same type as in Fenestella; apertures circular, with a slight peristome, arranged in one or two rows on the summits of slightly elevated, radially arranged, broad ridges; spaces between raised portions solid.

Genotype and only known species: *Sphragiopora parasitica* Ulrich. Mississippian.

Family ARTHROSTYLIDÆ Ulrich.

Zoarium articulated, consisting of numerous subcylindrical segments, united into small pinnate or bushy colonies, or of continuous, dichotomously divided branches; zoœcia subtubular, more or less oblique, radially arranged about a central axis, and opening on all sides of the segments; or one side may be noncelluliferous and longitudinally striated.

ARTHROSTYLUS Ulrich (Arthronema Ulrich).

Zoarium bushy, dichotomously branching, the whole consisting of numerous exceedingly slender, equal, subquadrate segments, united by terminal articulation; one face longitudinally striated, on each of the other, commonly three, faces a linear series of apertures between longitudinal ridges.

Genotype: *Helopora tenuis* James. Ordovician. Four species.

HELOPORA Hall.

Like Arthrostylus, but the segments are generally larger and have zoœcial apertures on all sides.

Genotype: *Helopora fragilis* Hall. Ordovician, Silurian. Twelve species.

ARTHROCLEMA Billings.

Zoarium of segments celluliferous on all sides, articulated terminally and laterally in a pinnate manner; apertures oval, in series between longitudinal ridges.

Genotype: *Arthroclema pulchellum* Billings. Ordovician. Six species.

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[1] Diploporaria proposed for Diplopora, preoccupied by Schafhäutl.

SCEPTROPORA Ulrich.

Zoarium of segments which become much expanded in their upper portion and at the top have a socket for the articulation of the next segment; lower portion striated, without apertures; upper part with apertures all around; apertures subovate, in linear series between longitudinal ridges.

Genotype: *Sceptropora facula* Ulrich. Ordovician, Silurian. Two species.

NEMATOPORA Ulrich.

Zoarium very slender, ramose, continuous above the pointed basal extremity; zoœcia subtubular, arranged radially around one or two minute axial tubes; apertures oval or subcircular; with peristome, generally in linear series between longitudinal ridges.

Genotype: *Nematopora ovalis* Ulrich. Range, Ordovician–Devonian. Fifteen species.

Family RHABDOMESONTIDÆ Vine.

Zoarium ramose or simple, not articulated, sometimes with an axial tube, but generally solid, in which case the axial region is occupied by thin-walled primitive tubes, with or without diaphragms; hemisepta usually present, but never conspicuous; apertures circular or oval, usually in linear series between longitudinal elevated ridges, or in diagonally intersecting series; vestibule a rhombic or hexagonal sloping area; mesopores generally absent.

RHOMBOPORA Meek.

Zoarium slender, ramose, solid; zoœcia thick-walled in vestibular region; apertures in longitudinal or diagonally intersecting series; acanthopores present, sometimes of two kinds, large and small.

Genotype: *Rhombopora lepidodendroides* Meek. Range, Silurian–Carboniferous. Twenty-nine described and several undescribed species.

RHABDOMESON Young and Young.

Zoarium with a slender axial tube, to which the proximal ends of the zoœcia are attached; otherwise like Rhombopora.

Genotype: *Millepora gracilis* Phillips; from the Carboniferous of England and Scotland. No American species have yet been made known.

CŒLOCONUS Ulrich.

Zoarium simple, hollow, very gradually expanding from an attenuated, striated base; zoœcia short, with well developed hemisepta, apertures in diagonally intersecting series.

Genotype: *Cœloconus rhombicus* Ulrich. Mississippian. Two species.

BACTROPORA Hall.

Zoarium simple or only slightly branched; lower extremity pointed; otherwise as in Rhombopora.

Genotype: *Trematopora ? granistriata* Hall. Devonian, Mississippian. Three species.

ORTHOPORA Hall.

Zoarium ramose, solid; apertures in parallel longitudinal rows, with ridges between; acanthopores present.

Genotype: *Trematopora regularis* Hall. Silurian, Devonian. Twenty-six species.

ACANTHOCLEMA Hall.

Zoarium slender, ramose; zoœcia tubular, arising from a filiform axis in the center of the branch; apertures oval, in diagonally intersecting series, or linear series separated by ridges; vestibules polygonal, broadly sloping; acanthopores between the apertures.

Genotype: *Trematopora alternata* Hall. Devonian, Mississippian. Six species.

NEMATAXIS Hall.

Zoarium slender, ramose; zoœcia long, tubular, diverging obliquely from a central filiform axis, near the surface bending abruptly; interspaces solid; apertures oval, in linear series, separated by ridges, with very thin, slightly elevated peristomes; on the surface at intervals there are monticules destitute of cell apertures, which extend around the branch, giving it an annulated appearance.

Genotype: *Nemataxis fibrosus* Hall. Devonian. Two species.

TROPIDOPORA Hall.

Zoarium slender, ramose; apertures in irregular longitudinal series, separated by sinuous ridges, with very thin slightly elevated peristomes.

Genotype and only known species: *Tropidopora nana* Hall. Devonian.

STREBLOTRYPA Ulrich.

Zoarium ramose, slender, solid; zoœcia long, tubular, diverging from the center; inferior hemiseptum best developed, situated rather far down; apertures regularly elliptical, with peristome, usually arranged in longitudinal series; below the apertures there are from one to twelve or more small pits, arranged, when numerous, in two or three rows; occasionally very small acanthopores present.

Genotype: *Streblotrypa nicklesi* Ulrich. Devonian, Carboniferous. Fifteen species.

HYPHASMOPORA Etheridge, Jun.

From the Carboniferous of Scotland.

Family CHAINODICTYONIDÆ.

CHAINODICTYON Foerste.

Zoarium retiform, of inosculating branches, which are undulated transversely on the reverse; zoœcia elongate, conical, or subtubular; apertures large, with thin interspaces in several rows, arranged in acutely diagonally intersecting series.

Genotype: *Chainodictyon laxum* Foerste. Carboniferous. Two species.

Family PTILODICTYONIDÆ Zittel.

Zoarium bifoliate, composed of two layers of zoœcia, grown together back to back, usually jointed, at least at the base, and forming leaf-like expansions or compressed branching or inosculating stems; mesotheca without median tubuli; zoœcia usually have hemisepta and semielliptical orifices; apertures usually ovate, surrounded either by a sloping area or a ringlike peristome; vestibules separated by thick walls.

PTILODICTYA Lonsdale (HETERODICTYA Nicholson).

Zoarium a simple, unbranched, lanceolate or falciform frond, narrow or wide, which articulates with a small basal expansion; in the young condition the zoarium consists of longitudinally arranged, narrow, oblong-quadrate zoœcia, new zoœcia of different width and arrangement being added subsequently on each side; walls of vestibules thick, solid, and with a double row of minute dots.

Genotype: *Flustra lanceolata* Lonsdale. Ordovician, Silurian. Sixteen species.

ESCHAROPORA Hall (NICHOLSONIA Waagen and Wentzel).

Like Ptilodictya, but distinguished chiefly by the arrangement of the apertures, which are in decussating series, and by the sloping hexagonal area which surrounds the apertures.

Genotype: *Escharopora recta* Hall. Ordovician. Fourteen described, and eleven new species.

CLATHROPORA Hall.

Zoarium composed of anastomosing branches, forming a regular network with round or oval fenestrules, with a pointed, articulating base; apertures usually subquadrate, arranged longitudinally.

Genotype: *Clathropora frondosa* Hall. Silurian, Devonian. Five species.

PHÆNOPORA Hall.

Like Ptilodictya, except that there are two mesopores in each interspace between the ends of the apertures.

Genotype: *Phænopora explanata* Hall. Ordovician, Silurian. Fourteen species.

ARTHROPORA Ulrich.

Zoarium bushy, composed of numerous articulating equal segments, spread in a plane; apertures elliptical, surrounded by a delicate peristome; interspaces with one or more thread-like ridges variously disposed, and with a row of minute papillæ.

Genotype: *Stictopora* (*Ptilodictya*) *shafferi* Meek. Ordovician. Five described and four new species.

GRAPTODICTYA Ulrich.

Zoarium a narrow bifurcating frond with a pointed base articulating with a small basal expansion; apertures subcircular, surrounded by a peristome subpolygonal in outline; interspaces depressed, usually with one or two fine tortuous elevated lines.

Genotype and only known species: *Ptilodictya elegans* Ulrich. Ordovician.

STICTOPORINA Hall.

Zoarium a simple or branching frond, from an obtusely pointed, articulating base; apertures oval, in decussating series, inclosed in rhomboidal or polygonal areas; interspaces elevated, angular.

Genotype: *Trematopora claviformis* Hall. Devonian. Three species.

Family STICTOPORELLIDÆ.

This family differs from the Ptilodictyonidæ mainly in that the zoarium is not articulated, but grows upward from, and is continuous with, a spreading base.

STICTOPORELLA Ulrich.

Zoarium branching, cribrose, or leaf-like; zoœcia with the primitive portion tubular, usually long, generally without hemisepta, the inferior one only occasionally present; orifices at the bottom of a wide, sloping vestibule; thick-walled, untabulated mesopores occur between the apertures and line the margins of the zoarium.

Genotype: *Stictoporella interstincta* Ulrich = *Ptilodictya flexuosa* James. Ordovician. Nine described and four new species.

PTILOTRYPA Ulrich.

Zoarium ramose, with compressed or frondescent branches; surface with irregular longitudinally channeled areas appearing like maculæ;

zoœcia long oblique tubes, with an occasional diaphragm; apertures ovate, very oblique, acute anteriorly, posterior margin somewhat elevated; at the upper extremity of the aperture an accessory pore.

Genotype and only known species: *Ptilotrypa obliquata* Ulrich. Ordovician.

Intrapora Hall.

Zoarium ramose, from a spreading base, branches compressed, dividing dichotomously; zoœcia tubular, at first parallel to the mesotheca, then bend abruptly outward; apertures oval, with peristome; interspaces with minute angular pits, the openings of the numerous tabulated mesopores; the interspaces sometimes solid, the mesopores having been closed by a deposit of horizontally laminated calcareous tissue.

Genotype: *Intrapora puteolata* Hall. Devonian, Mississippian. Three species.

Coscinella Hall.

Zoarium an explanate frond, of anastomosing branches, from a spreading base; zoœcia tubular, resting upon the mesotheca, with rather long, direct vestibules; spaces between the vestibules and the margins of the fenestrules occupied by numerous tabulated mesopores, opening upon the surface as minute angular pits; apertures circular, irregularly disposed.

Genotype: *Coscinella elegantula* Hall and Simpson. Devonian. Two species.

Tæniodictya Ulrich.

Zoarium ramose, rising from a basal expansion; branches rather narrow, compressed; zoœcia short, tubular, oblong, both hemisepta present; orifices subcircular, at bottom of a sloping vestibular area; interspaces ridgelike.

Genotype: *Tæniodictya ramulosa* Ulrich. Devonian, Mississippian. Seven species.

Stictopora Hall.

Zoarium ramose; zoœcial tubes long, without hemisepta; apertures with distinct peristomes; interspaces wide, sometimes with raised lines.

Genotype: *Stictopora elegantula* Hall. Ordovician.

Heliotrypa Ulrich.

Zoarium bifoliate; zoœcia subtubular, thin-walled, and prostrate upon the mesotheca, superior hemiseptum moderately developed; vestibules with thick walls, traversed obliquely by radially arranged minute tubuli; spaces between vestibules of variable width, occupied by numerous, irregular, thick-walled, tabulated mesopores, which are also clustered at intervals into maculæ; orifices circular, at the bottom of the sloping vestibule.

Genotype and only known species: *Heliotrypa bifolia* Ulrich. Mississippian.

Family RHINIDICTYONIDÆ Ulrich.

Zoarium bifoliate, continuous or jointed, consisting of compressed branches or leaf-like expansions; occasionally trifoliate; zoœcia subquadrate, arranged longitudinally, inferior hemiseptum wanting; orifices and apertures elliptical or subcircular, sometimes a little truncated posteriorly; median tubuli between the median laminæ and between the longitudinal rows of zoœcia; mesopores wanting, but vesicular tissue often developed.

RHINIDICTYA Ulrich.

Zoarium ramose, consisting of narrow, compressed, bifurcating, straight-edged branches with parallel margins, attached to foreign bodies by a continuous expanded base; apertures in longitudinal series between slightly elevated or flexuous ridges, carrying a crowded row of small blunt spines; space immediately surrounding the apertures sloping up to the summits of the ridges.

Genotype: *Rhinidictya nicholsoni* Ulrich. Ordovician. Nineteen species.

EURYDICTYA Ulrich.

Zoarium a broad, simple or irregularly divided, bifoliate expansion; surface with more or less conspicuous, small, solid maculæ or monticules; structure otherwise about as in Rhinidictya.

Genotype: *Eurydictya montifera* Ulrich. Ordovician. Four species.

PACHYDICTYA Ulrich.

Zoarium ramose, of narrow bifurcating stipes, with parallel margins, or irregular undulating fronds, with acute, nonporiferous margins; surface with small maculæ, surrounded by apertures slightly larger than the average; sometimes the marginal rows of apertures are also slightly larger than the average; zoœcia with thin walls, elliptical or subquadrate in shape, separated from adjoining zoœcia by small vesicles; vestibules direct, walls thickened and appearing ringlike in sections; spaces between vestibules traversed by one or more series of minute tubuli; one or more diaphragms developed; apertures commonly elliptical; interspaces usually forming a peristome about the apertures.

Genotype: *Pachydictya robusta* Ulrich. Ordovician, Silurian. Twenty-five described and several new species.

PHYLLODICTYA Ulrich.

Zoarium simple or irregularly branched, growing from an expanded basal attachment; zoœcia long, tubular, with diaphragms but no hemisepta, bending very gradually outward from the central axis, thus causing the apertures to be more or less strongly oblique, with the posterior edge liplike; interspaces wide, subsolid, traversed vertically by one or two rows of minute tubuli, which appear as papillæ at the surface.

Genotype: *Phyllodictya frondosa* Ulrich. Ordovician. Two species.

EUSPILOPORA Ulrich.

Zoarium consisting of small, irregularly divided branches, with serrated or wavy edges; apertures in four or more linear series on the middle of the branch, between slightly elevated longitudinal ridges bearing numerous small nodes; alternately on the two sides are short rows directed obliquely upward; between the ends of the zoœcia shallow, lenticular vesicles are found; interspaces traversed vertically by numerous minute tubuli.

Genotype: *Euspilopora serrata* Ulrich. Devonian. Four species.

DICRANOPORA Ulrich.

Zoarium jointed; segments ligulate, rarely simple, usually bifurcating at the upper end; each extremity somewhat thickened; minute structure of zoœcia and arrangement of apertures as in Rhinidictya.

Genotype: *Ptilodictya internodia* Miller and Dyer. Ordovician, Silurian. Five species.

GONIOTRYPA Ulrich.

Zoarium with a prominent median ridge upon both sides of the double-leaved segments; otherwise like Dicranopora.

Genotype and only known species: *Goniotrypa bilateralis* Ulrich. Ordovician.

TRIGONODICTYA Ulrich.

Zoarium of triangular branches, constructed upon the plan of Prismopora, but with zoœcia and all minute details of structure as in Pachydictya.

Genotype: *Trigonodictya conciliatrix* Ulrich. Ordovician, Silurian. Two described and two new species.

Family CYSTODICTYONIDÆ Ulrich.

Zoarium consisting of two or three layers of cells grown together back to back, forming branching, fenestruled, or entire leaf-like expansions or triangular branches; zoœcia semicordate or obovate-acuminate in outline, arranged longitudinally; orifices subcircular, vestibule elongated; apertures with peristome and more or less well-developed lunarium; interzoœcial spaces occupied by vesicular tissue, often filled with a calcareous deposit near the surface.

CYSTODICTYA Ulrich (ARCANOPORA Vine, STICTOCELLA Simpson).

Zoarium ramose, branches sharply elliptical in cross section, with subparallel, nonporiferous margins; apertures subelliptical, in linear series between longitudinal ridges, which may not always be present, lunarium on the side of the aperture nearest the margin of the branch; interspaces finely striated, granulose or smooth; pits and cells show only in a worn condition.

Genotype: *Cystodictya ocellata* Ulrich. Range, Devonian-Carboniferous. Thirty-five species.

DICHOTRYPA Ulrich.

Zoarium a large, thin, bifoliate expansion; surface with solid maculæ; otherwise as in Cystodictya.

Genotype: *Dichotrypa foliata* Ulrich. Devonian, Mississippian: Seven species.

COSCINIUM Keyserling (COSCINOTRYPA Hall and Simpson).

Zoarium of flattened branches, celluliferous on both sides, which inosculate at short intervals till there is produced a broad frond, perforated at rythmical intervals by circular or elliptical fenestrules; in other respects like Cystodictya.

Genotype: *Coscinium cyclops* Keyserling. Range, Devonian-Carboniferous. Five species.

TÆNIOPORA Nicholson (PTEROPORA Hall, STICTOPORIDRA Simpson).

Zoarium with a strongly elevated longitudinal central ridge on each face, so that a cross section of the branches is somewhat rhomboidal; otherwise like Cystodictya.

Genotype: *Tæniopora exigua* Nicholson. Devonian. Five species.

THAMNOTRYPA Hall (Thamnopora Hall).

Zoarium consisting of a very narrow stipe, from which proceed rectangularly lateral branches; celluliferous on each face; cell apertures oval; usually disposed in two parallel longitudinal rows, separated by a prominent ridge. Sometimes three rows occur and occasionally four rows for a short distance on the stipe. On the lateral branches there are never more than two rows.[1]

Genotype and only known species: *Thamnopora divaricata* Hall. Devonian.

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[1] Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 546.

SEMIOPORA Hall.

Zoarium a flattened, bifurcating frond, proceeding from a spreading base; branches narrow, with parallel margins and a narrow non-celluliferous marginal space; interzoœcial spaces occupied by vesicular tissue; apertures oval or subcircular, regularly disposed in parallel longitudinal rows; apertures largest in marginal rows; between the apertures in a longitudinal direction are the openings of two small mesopores side by side.

Genotype and only known species: *Semiopora bistigmata* Hall. Devonian.

PTILOCELLA Simpson.

Zoarium ensiform, with a pointed, striated base; apertures circular, arranged in parallel, longitudinal rows, separated by ridges; margins of frond striated, non-celluliferous.

Genotype and only known species: *Ptilodictya parallela* Hall. Devonian

ACROGENIA Hall.

Zoarium segmented, arising from cylindrical rootlets; two segments proceed from the truncated termination of the proceeding one; segments obconical and striated at the base, gradually becoming flattened and showing apertures; apertures largest in the marginal rows, with prominent lunarium, in linear series separated by ridges.

Genotype and only known species: *Acrogenia prolifera* Hall. Devonian.

PRISMOPORA Hall.

Zoarium ramose, of triangular, bifurcating or trifurcating branches, sometimes anastomosing and forming clumps; branches with the sides subequal, usually a little concave, edges sharp, sometimes serrated or wavy; zoœcia arise from mesothecæ which radiate from the center to the margins; apertures varying in arrangement, sometimes on the summits of small papillæ; structure otherwise as given for the family.

Genotype: *Prismopora triquetra* Hall. Range, Devonian-Carboniferous. Nine species.

SCALARIPORA Hall.

Zoarium with the faces of the triangular branches crossed by salient transverse ridges; otherwise like Prismopora.

Genotype: *Scalaripora scalariformis* Hall. Devonian. Five species.

GLYPTOPORA Ulrich.

Zoarium a thin expansion, traversed on both surfaces by salient ridges or crests, uniting so as to form larger or smaller cup-shaped cavities; or a unilaminate base on which the ridges are greatly developed and form large leaves; these ridges or leaves are composed of two layers of zoœcia growing in opposite directions from a mesotheca; in the angles of each cup is a depressed noncelluliferous furrow which with similar furrows in neighboring cups produces a thin junction between the leaves; surface of the ridges and of the cups with elongated solid maculæ or "dimples;" structure otherwise as given for the family.

Genotype: *Coscinium plumosum* Prout. Mississippian. Eight species.

PHRACTOPORA Hall.

Like Glyptopora except that the apertures are relatively more rounded and larger, and the junction angles are celluliferous and thicker than any other part of the leaves.

Genotype: *Phractopora cristata* Hall. Devonian, Mississippian. Four species.

CERAMELLA Hall.

Zoarium consisting of thin, foliaceous expansions, arising from a spreading base; celluliferous on each face; cells tubular, oblique; cell apertures oval or circular, disposed in quincunx order; surface marked by sterile maculæ, which are usually depressed below the general surface of the branch.[1]

Genotype and only known species: *Ceramella scidacea* Hall. Devonian.

EVACTINOPORA Meek and Worthen.

Zoarium free, consisting of four or more vertical leaves, arranged in a cruciform or stellate manner; rays free in the upper half, united, thick, and nonporiferous in the basal portion; apertures on both faces of the leaves or rays, subcircular; interspaces solid at the surface, occupied by vesicular tissue internally.

Genotype: *Evactinopora radiata* Meek and Worthen. Mississippian. Four species.

GONIOCLADIA Etheridge, Jun. (CARINELLA Etheridge, Jun.).

Family ACTINOTRYPIDÆ Ulrich

ACTINOTRYPA Ulrich.

Zoarium a thin bifoliate expansion; apertures show the projecting ends of from eight to ten vertical septa-like ridges that extend down along the sides of the vestibule nearly or quite to the orifice.

Genotype and only known species: *Fistulipora peculiaris* Rominger. Mississippian.

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[1] Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 527.

Family CYCLOPORIDÆ.

CYCLOPORA Prout.

Zoarium unilaminar, parasitic or free; zoœcia subtubular, hemisepta wanting or but little developed; vestibules with rather thick walls; between the vestibules are mesopores crossed by thick diaphragms, which usually have a central perforation and are open at the surface; apertures subcircular, with a smooth or granulose peristome; acanthopores sometimes present.

Genotype: *Cyclopora fungia* Prout. Mississippian. Two species.

CYCLOPORELLA Ulrich.

Zoarium a thin discoidal expansion; zoœcia subtubular; vestibules with a succession of superior hemisepta; irregular mesopores abundant; numerous acanthopores of large size.

Genotype: *Cycloporella spinifera* Ulrich. Mississippian. Two species.

PROUTELLA Ulrich.

Zoarium discoid, thin, free, under surface with a concentrically wrinkled epitheca; zoœcia subtubular, thin-walled; apertures broad-elliptical, surrounded by a narrow sloping area, hexagonal in outline; when perfect the apertures have a depressed calcareous plate that closes a little less than two-thirds of the opening, the orifice left being subtriangular in form, without thickened margins, and situated at the anterior side; with age the vestibules become elongated and are intersected by incomplete diaphragms.

Genotype and only known species: *Cyclopora discoidea* Prout. Mississippian.

WORTHENOPORA Ulrich.

Zoarium bifoliate, branching or palmate; zoœcia very regularly arranged, elongate rhomboidal; apertures semielliptical, the truncated posterior margin somewhat raised; on the surface the line of junction between adjoining zoœcia is marked by an elevated ridge; the elongate triangular space below the apertures perfectly plain.

Genotype: *Worthenopora spinosa* Ulrich. Mississippian. Two species.

Family RHINOPORIDÆ Ulrich.

Zoarium variable in form; zoœcia prone along the basal membrane, simple, oblong, or rhomboidal; vestibules direct, hemisepta wanting or almost so; front of zoœcia below vestibule commonly strengthened with solid or vesicular tissue.

RHINOPORA Hall.

Zoarium forming large, undulating bifoliate expansions, celluliferous on both sides; surface usually smooth, rarely with solid monticules, and traversed by slender, rounding, bifurcating ridges, which appear as shallow grooves when the surface is worn; apertures nearly circular, occupying the summits of prominent papillæ; mesopores present, but closed at the surface; large median tubuli in the mesotheca.

Genotype: *Rhinopora verrucosa* Hall. Silurian. Three species.

DIAMESOPORA Hall.

Zoarium ramose, of hollow stems lined internally by an epitheca; zoœcia simple, hexagonal, or rhomboidal, with an oval orifice in the anterior half, which with growth forms a tubular vestibule; apertures with peristomes equally elevated or highest posteriorly; intervestibular spaces compact or horizontally laminated.

Genotype: *Diamesopora dichotoma* Hall. Silurian. Five species.

LICHENALIA Hall.

Zoarium a subcircular unilaminar expansion; zoœcia prostrate; elongate-subrhomboidal, with direct subtubular vestibules; apertures rounded, with peristome much elevated on the posterior side; interspaces depressed, ? cellulose.

Genotype and only known species: *Lichenalia concentrica* Hall. Silurian.

STICTOTRYPA Ulrich.

Zoarium ramose, not pointed at the base; branches dichotomously dividing, narrow, compressed; apertures circular or elliptical, with distinct, evenly elevated peristome; interspaces flat or concave, composed of horizontally laminated solid tissue.

Genotype: *Stictopora similis* Hall. Silurian. Three species.

Suborder CHILOSTOMATA Busk.

Zoœcia oval, turbinate, urceolate, quadrate, or hexagonal, arranged usually side by side; orifice more or less anterior, of less diameter than the zoœcium, closed by a movable cover; ova commonly matured in external marsupia: appendicular organs frequently present.

Family PALESCHARIDÆ Ulrich.

PALESCHARA Hall.

Zoarium forming thin incrustations upon Orthocerata and other organisms; zoœcia very short, direct, with thin walls; apertures (if such they can be called) long hexagonal or polygonal.

Genotype: *Paleschara incrustans* Hall. Range, Ordovician-Devonian. Thirteen species.

FOREIGN GENERA.

A number of generic terms, founded for species occurring in European Paleozoic deposits, have been proposed in European publications, but have not found their way into American literature. A list of these is subjoined, though it is scarcely probable that the list is complete. A considerable number of these generic terms appeared before naturalists had begun to feel the necessity for precise and complete diagnoses and descriptions, so that it is not possible to fit them into our present classification. When the material is examined upon which they were based, most of these early genera will be found to occupy the same ground as genera founded much later and now in current use. Scarcely any of the genera listed below have received a second treatment, so that nothing has been added to the original unsatisfactory descriptions. We have thought that it might not be amiss to hazard a guess, based on descriptions and figures, both commonly lacking definiteness, as to what these genera may prove to be.

ACANTHOPORA Young and Young.

Acanthopora Young and Young, Proc. Nat. Hist. Soc. Glasgow, II, 1875, p. 327; Vine, Proc. Yorkshire Geol. Polyt. Soc., IX, 1885, p. 83. Genotype: *Glauconome* (*Acanthopora*) *stellipora* Young and Young, Proc. Nat. Hist. Soc. Glasgow, II, 1875, p. 327, pl. iv, 25, 26.

This subgenus seems to be based upon the perfect condition of the aperture of *Pinnatopora*, a feature of not even specific importance. However, the name would drop anyway, as it was used by D'Orbigny, Prodr. de Pal., I, 1850, p. 318.

AMORPHOTRYPA Whidborne.

Amorphotrypa Whidborne, Devonian Fauna England, II, Part 4, 1895, p. 181 (Pal. Soc. Publ., XLIX). Genotype: *Isotrypa? Gregorii* Whidborne, loc. cit., p. 181, pl. xx, 1-2 *e*.

This genus, whose structure can not be said to be fully understood as yet, seems closely related to *Isotrypa*. It is a member of the Fenestellidæ.

ARCHÆOPORA Eichwald.

Archæopora Eichwald, Lethæa Rossica, I, 1860, p. 405.

Eight species are given by Eichwald under this genus, which appears to cover some of the ground, at least, which is now included in *Callopora* Hall.

CHASMATOPORA Eichwald.

Chasmatopora Eichwald, Lethæa Rossica, I, 1860, p. 370. Only species given: *C. tenella* Eichwald, loc. cit., p. 371.

This appears to be a *Phylloporina*.

DIPHTHEROPORA De Koninck.

Diphtheropora De Koninck, Recherches sur les Animaux Fossiles, part 2, 1873, p. 13. Genotype (only species): *D. regularis* De Koninck, loc. cit., p. 13, pl. i, 4.

This is almost certainly an *Eridopora.*

DISTEICHIA Sharpe.

Disteichia Sharpe, Quar. Jour. Geol. Soc. London, IX, 1853, p. 146. Only species: *D. reticulata* Sharpe, loc. cit., p. 146, pl. vii, 8 a–d.

This appears to be a synonym for *Clathropora* Hall

FILITES (Barrande) Počta.

Filites (Barrande) Počta, Système Silurien Bohême, VIII, tome 1, 1894, p. 108. Genotype: *F. cribrosus* Počta, loc. cit., p. 110, pl. x, 19–25.

This appears to be a type not yet discovered in American strata.

LEMMATOPORA Počta.

Lemmatopora Počta, Système Silurien Bohême, VIII, tome 1, 1894, p. 102. Genotype: *L. angulosa* Počta, loc. cit., p. 105, pl. ii, 20–21.

This genus as described seems in part equivalent to *Stictoporella* Ulrich, but probably includes forms referable to other genera.

MASTOPORA Eichwald.

Mastopora Eichwald, Lethæa Rossica, I, 1860, p. 434. Only species: *M. concava* Eichwald, loc. cit., p. 434, pl. xxvii, 7 a–d.

This may be related to *Rhinopora* Hall.

MICROPORA Eichwald.

Micropora Eichwald, Lethæa Rossica, I, 1860, p. 393.

Three species are given, *M. gracilis* Eichwald, *M. cyclostomoides*, *M. rhombica.* May be *Stictoporella*, or perhaps *Clathropora.*

MYRIOLITHES Eichwald.

Myriolithes Eichwald, Lethæa Rossica, I, 1860, p. 450.

Four species are cited; probably monticuliporoids.

PTEROPORA Eichwald.

Pteropora Eichwald, Lethæa Rossica, I, 1860, p. 395.

Two species, *P. pennula* and *P. exilis*, are given. Eichwald says his genus is related to *Ichthyorachis* McCoy.

RHABDINOPORA Eichwald.

Rhabdinopora Eichwald, Lethæa Rossica, I, 1860, p. 368.

Two species, *R. flabelliformis* Eichwald and *R. undulata* Eichwald, are given. Seems to be a fenestellid with one row of cells to the branch; this is a type unknown to us, unless it be a case of defective observation.

SERIOPORA Počta.

Seriopora Počta, Système Silurien Bohême, VIII, tome 1, 1894, p. 78. Genotype: *S. petala* Počta, loc. cit., p. 79, pl. xiii, 8-12.

Počta has undoubtedly wrongly interpreted D'Orbigny's genus *Reteporina*, which was based on Goldfuss's *Retepora prisca*. Počta's *Seriopora* is the *Reteporina* of D'Orbigny, as interpreted by Simpson and as we give it; Počta's *Reteporina* (loc. cit., p. 80) appears to be in part *Fenestella* and perhaps, in part, another as yet unnamed genus of the Fenestellidæ.

SULCORETEPORA D'Orbigny.

Sulcoretepora D'Orbigny, Prodr. de Pal., I, 1850, p. 152.

This genus was based upon *Flustra parallela* Phillips, 1833. The definition given is too meager for recognition. The *Flustra parallela* of Phillips is now considered to be a *Cystodictya.*

UTROPORA Počta.

Utropora Počta, Système Silurien Bohême, VIII, tome 1, 1894, p. 75. Genotype: *U. nobilis* (Barrande) Počta, loc. cit., p. 76, pl. xvii, 4-17.

Like *Fenestella*, but differs chiefly in having very much elongated fenestrules (6 by 1 mms.) and in lacking a median keel.

LIST OF GENERA, SHOWING SYSTEMATIC POSITION.

Genus.	Family.	Suborder.
Acanthocladia King.	Acanthocladiidæ.	Cryptostomata.
Acanthoclema Hall.	Rhabdomesontidæ.	Cryptostomata.
Acrogenia Hall.	Cystodictyonidæ.	Cryptostomata.
Actinotrypa Ulrich.	Actinotrypidæ.	Cryptostomata.
Amplexopora Ulrich.	Amplexoporidæ.	Trepostomata.
Anisotrypa Ulrich.	Batostomellidæ.	Trepostomata.
Anolotichia Ulrich.	Ceramoporidæ.	Cyclostomata.
Archimedes Owen.	Fenestellidæ.	Cryptostomata.
Arthroclema Billings.	Arthrostylidæ.	Cryptostomata.
Arthropora Ulrich.	Ptilodictyonidæ.	Cryptostomata.
Arthrostylus Ulrich.	Arthrostylidæ.	Cryptostomata.
Ascodictyon Nicholson and Etheridge Jun.	Ascodictyonidæ.	Ctenostomata.
Aspidopora Ulrich.	Monticuliporidæ.	Trepostomata.
Atactopora Ulrich.	Heterotrypidæ.	Trepostomata.

Genus.	Family.	Suborder.
Atactoporella Ulrich.	Monticuliporidæ.	Trepostomata.
Bactropora Hall.	Rhabdomesontidæ.	Cryptostomata.
Batostoma Ulrich.	Trematoporidæ.	Trepostomata.
Batostomella Ulrich.	Batostomellidæ.	Trepostomata.
Berenicea Lamouroux.	Diastoporidæ.	Cyclostomata.
Botryllopora Nicholson.	Botrylloporidæ.	Cyclostomata.
Buskopora Ulrich.	Fistuliporidæ.	Cyclostomata.
Bythopora Miller and Dyer.	Batostomellidæ.	Trepostomata.
Bythotrypa Ulrich.	Ceramoporidæ.	Cyclostomata.
Callopora Hall.	Calloporidæ.	Trepostomata.
Calloporella Ulrich.	Calloporidæ.	Trepostomata.
Callotrypa Hall.	Batostomellidæ.	Trepostomata.
Ceramella Hall.	Cystodictyonidæ.	Cryptostomata.
Ceramophylla Ulrich.	Ceramoporidæ.	Cyclostomata.
Ceramopora Hall.	Ceramoporidæ.	Cyclostomata.
Ceramoporella Ulrich.	Ceramoporidæ.	Cyclostomata.
Chainodictyon Foerste.	Chainodictyonidæ.	Cryptostomata.
Chiloporella Ulrich.	Ceramoporidæ.	Cyclostomata.
Chilotrypa Ulrich.	Fistuliporidæ.	Cyclostomata.
Clathropora Hall.	Ptilodictyonidæ.	Cryptostomata.
Clonopora Hall.	Entalophoridæ.	Cyclostomata.
Cœlocaulis Hall.	Fistuliporidæ.	Cyclostomata.
Cœloclema Ulrich.	Ceramoporidæ.	Cyclostomata.
Cœloconus Ulrich.	Rhabdomesontidæ.	Cryptostomata.
Constellaria Dana.	Constellariidæ.	Trepostomata.
Coscinella Hall.	Stictoporellidæ.	Cryptostomata.
Coscinium Keyserling.	Cystodictyonidæ.	Cryptostomata.
Crepipora Ulrich.	Ceramoporidæ.	Cyclostomata.
Crisinella Hall.	Idmoneidæ.	Cyclostomata.
Cyclopora Prout.	Cycloporidæ.	Cryptostomata.
Cycloporella Ulrich.	Cycloporidæ.	Cryptostomata.
Cyclotrypa Ulrich.	Fistuliporidæ.	Cyclostomata.
Cystodictya Ulrich.	Cystodictyonidæ.	Cryptostomata.
Cystopora Hall.	Entalophoridæ.	Cyclostomata.
Dekayella Ulrich.	Heterotrypidæ.	Trepostomata.
Dekayia Milne-Edwards and Haime.	Heterotrypidæ.	Trepostomata.
Diamesopora Hall.	Rhinoporidæ.	Cryptostomata.
Diastoporina Ulrich.	Diastoporidæ.	Cyclostomata.
Dichotrypa Ulrich.	Cystodictyonidæ.	Cryptostomata.
Dicranopora Ulrich.	Rhinidictyonidæ.	Cryptostomata.
Diploclema Ulrich.	Entalophoridæ.	Cyclostomata.
Diploporaria.	Acanthocladiidæ.	Cryptostomata.
Diplotrypa Nicholson.	Trematoporidæ.	Trepostomata.
Discotrypa Ulrich.	Amplexoporidæ.	Trepostomata.
Dittopora Dybowski.	Constellariidæ.	Trepostomata.
Drymotrypa Ulrich.	Phylloporinidæ,	Cryptostomata.
Eridopora Ulrich	Fistuliporidæ.	Cyclostomata.
Eridotrypa Ulrich.	Batostomellidæ.	Trepostomata.
Escharopora Hall	Ptilodictyonidæ.	Cryptostomata.
Eurydictya Ulrich.	Rhinidictyonidæ.	Cryptostomata.
Euspilopora Ulrich.	Rhinidictyonidæ.	Cryptostomata.

Genus.	Family.	Suborder.
opora Meek and hen.	Cystodictyonidæ.	Cryptostomata.
la Hall.	Fistuliporidæ.	Cyclostomata.
lla Lonsdale.	Fenestellidæ.	Cryptostomata.
alia Prout.	Fenestellidæ.	Cryptostomata.
apora Hall.	Fenestellidæ.	Cryptostomata.
ora McCoy.	Fistuliporidæ.	Cyclostomata.
rypa Hall.	Fistuliporidæ.	Cyclostomata.
ora Ulrich.	Cystodictyonidæ.	Cryptostomata.
adia Etheridge,	Cystodictyonidæ.	Cryptostomata.
ypa Ulrich.	Rhinidictyonidæ.	Cryptostomata.
lictya Ulrich.	Ptilodictyonidæ.	Cryptostomata.
lla Hall.	Diastoporidæ.	Cyclostomata.
ora Claypole.	Fenestellidæ.	Cryptostomata.
ypa Ulrich.	Stictoporellidæ.	Cryptostomata.
ra Hall.	Arthrostylidæ.	Cryptostomata.
ragma Ulrich.	Trematoporidæ.	Trepostomata.
ypa Phillips.	Fenestellidæ.	Cryptostomata.
ia Hall.	Diastoporidæ.	Cyclostomata.
rypa Nicholson.	Heterotrypidæ.	Trepostomata.
nella Waagen and zel.	Fistuliporidæ.	Cyclostomata.
ypa Ulrich.	Monticuliporidæ.	Trepostomata.
ypella Ulrich.	Monticuliporidæ.	Trepostomata.
mopora Etheridge,	Rhabdomesontidæ.	Cryptostomata.
rachis McCoy.	Acanthocladiidæ.	Cryptostomata.
pa Ulrich.	Constellariidæ.	Trepostomata.
ra Hall.	Stictoporellidæ.	Cryptostomata.
a Hall.	Fenestellidæ.	Cryptostomata.
ypa Ulrich.	Heterotrypidæ.	Trepostomata.
lia Hall.	Rhinoporidæ.	Cryptostomata.
trypa Ulrich.	Fistuliporidæ.	Cyclostomata.
a Ulrich.	Batostomellidæ.	Trepostomata.
ella Foerste.	Batostomellidæ.	Trepostomata.
ora Hall.	Fenestellidæ.	Cryptostomata.
ra Hall.	Fenestellidæ.	Cryptostomata.
ora Ulrich.	Fistuliporidæ.	Cyclostomata.
pa Ulrich.	Monticuliporidæ.	Trepostomata.
ma Ulrich.	Entalophoridæ.	Cyclostomata.
ypa Nicholson.	Trematoporidæ.	Trepostomata.
ypella Ulrich.	Amplexoporidæ.	Trepostomata.
lipora D'Orbigny.	Monticuliporidæ.	Trepostomata.
xis Hall.	Rhabdomesontidæ.	Cryptostomata.
pora Ulrich.	Arthrostylidæ.	Cryptostomata.
onella Ulrich.	Constellariidæ.	Trepostomata.
a Eichwald.	Heterotrypidæ.	Trepostomata.
ra Hall.	Rhabdomesontidæ.	Cryptostomata.
ictya Ulrich.	Rhinidictyonidæ.	Cryptostomata.
ara Hall.	Palescharidæ.	Chilostomata.
ora Nicholson.	Monticuliporidæ.	Trepostomata.
ypa Ulrich.	Amplexoporidæ.	Trepostomata.

Genus.	Family.	Suborder.
Petigopora Ulrich.	Heterotrypidæ.	Trepostomata.
Phacelopora Ulrich.	Phaceloporidæ.	Cyclostomata.
Phænopora Hall.	Ptilodictyonidæ.	Cryptostomata.
Phractopora Hall.	Cystodictyonidæ.	Cryptostomata.
Phyllodictya Ulrich.	Rhinidictyonidae.	Cryptostomata.
Phyllopora King.	Fenestellidæ.	Cryptostomata.
Phylloporina Ulrich.	Phylloporinidae.	Cryptostomata.
Pinacotrypa Ulrich.	Fistuliporidæ.	Cyclostomata.
Pinnatopora Vine.	Acanthocladiidæ.	Cryptostomata.
Polypora McCoy	Fenestellidæ.	Cryptostomata.
Prasopora Nicholson and Etheridge Jun.	Monticuliporidæ.	Trepostomata.
Prismopora Hall.	Cystodictyonidæ.	Cryptostomata.
Proboscina Audouin.	Diastoporidæ.	Cyclostomata.
Protocrisina Ulrich.	Idmoneidæ.	Cyclostomata.
Proutella Ulrich.	Cycloporidæ.	Cryptostomata.
Ptilocella Simpson.	Cystodictyonidæ.	Cryptostomata.
Ptilodictya Lonsdale.	Ptilodictyonidæ.	Cryptostomata.
Ptilopora McCoy.	Acanthocladiidæ.	Cryptostomata.
Ptiloporella Hall.	Fenestellidæ.	Cryptostomata.
Ptiloporina Hall.	Fenestellidæ.	Cryptostomata.
Ptilotrypa Ulrich.	Stictoporellidæ.	Cryptostomata.
Ramipora Toula.	Acanthocladiidæ.	Cryptostomata.
Reteporidra.	Fenestellidæ.	Cryptostomata.
Reteporina D'Orbigny.	Fenestellidæ.	Cryptostomata.
Reptaria Rolle.	Diastoporidæ.	Cyclostomata.
Rhabdomeson Young and Young.	Rhabdomesontidæ.	Cryptostomata.
Rhinidictya Ulrich.	Rhinidictyonidæ.	Cryptostomata.
Rhinopora Hall.	Rhinoporidæ.	Cryptostomata.
Rhombopora Meek.	Rhabdomesontidæ.	Cryptostomata.
Rhopalonaria Ulrich.	Rhopalonariidæ.	Ctenostomata.
Scalaripora Hall.	Cystodictyonidæ.	Cryptostomata.
Scenellopora Ulrich.	Ceramoporidæ.	Cyclostomata.
Sceptropora Ulrich.	Arthrostylidæ.	Cryptostomata.
Selenopora Hall.	Fistuliporidæ.	Cyclostomata.
Semicoscinium Prout.	Fenestellidæ.	Cryptostomata.
Semiopora Hall.	Cystodictyonidæ.	Cryptostomata.
Septopora Prout.	Acanthocladiidæ.	Cryptostomata.
Spatiopora Ulrich.	Ceramoporidæ.	Cyclostomata.
Sphragiopora Ulrich.	Sphragioporidæ.	Cryptostomata.
Stellipora Hall.	Constellariidæ.	Trepostomata.
Stenopora Lonsdale.	Batostomellidæ.	Trepostomata.
Stictopora Hall.	Stictoporellidæ.	Cryptostomata.
Stictoporella Ulrich.	Stictoporellidæ.	Cryptostomata.
Stictoporina Hall and Simpson.	Ptilodictyonidæ.	Cryptostomata.
Stictotrypa Ulrich.	Rhinoporidæ.	Cryptostomata.
Stomatopora Bronn.	Diastoporidæ.	Cyclostomata.
Streblotrypa Ulrich.	Rhabdomesontidæ.	Cryptostomata.
Stromatotrypa Ulrich.	Trematoporidæ.	Trepostomata.
Strotopora Ulrich.	Fistuliporidæ.	Cyclostomata.
Synocladia King.	Acanthocladiidæ.	Cryptostomata.

Genus.	Family.	Suborder.
ctya Ulrich.	Stictoporellidæ.	Cryptostomata.
ra Nicholson.	Cystodictyonidæ.	Cryptostomata.
igma Hall.	Batostomellidæ.	Trepostomata.
cus King.	Fenestellidæ.	Cryptostomata.
trypa Hall.	Cystodictyonidæ.	Cryptostomata.
lla Hall.	Batostomellidæ.	Trepostomata.
pora Hall.	Trematoporidæ.	Trepostomata.
lictya Ulrich.	Rhinidictyonidæ.	Cryptostomata.
pora Hall.	Rhabdomesontidæ.	Cryptostomata.
a Hall.	Fenestellidæ.	Cryptostomata.
Ulrich.	Ascodictyonidæ.	Ctenostomata.
iopora Ulrich.	Cycloporidæ.	Cryptostomata.

LIST OF INVALID GENERIC NAMES.

stoma Young and Young=Fenestella Lonsdale.
Lamouroux (preoccupied). Now Stomatopora Bronn.
mopora Simpson=Reteporidra.
opora Vine=Cystodictya Ulrich.
nedipora D'Orbigny=Archimedes Owen.
nema Ulrich (preoccupied). Now Arthrostylus Ulrich.
lla Etheridge, Jun. Now Goniocladia Etheridge, Jun.
pora Nicholson=Semicoscinium Prout.
otrypa Hall and Simpson=Coscinium Keyserling.
pora Nicholson=Semicoscinium Prout.
orina Simpson=Semicoscinium Prout.
icopora De Koninck=Ptilopora McCoy.
lites Eichwald.
pora of authors (not Lamouroux)=Berenicea Lamouroux.
porella Vine=Berenicea Lamouroux.
iopora Ulrich=Fistulipora McCoy.
ora Young and Young=Diploporaria.
vskia Waagen and Pichl=Fistulipora McCoy.
vskiella Waagen and Pichl=Fistulipora McCoy.
pora D'Orbigny. Not recognized.
rellina D'Orbigny. Not recognized.
cella Simpson=Pinacotrypa Ulrich.
porella Simpson=Fistulipora McCoy.
poridra Simpson=Favicella Hall.
iporina Simpson=Pinacotrypa Ulrich.
liporella Simpson=Polypora McCoy.
liporina Simpson=Fenestella Lonsdale.
zella Waagen and Wentzel=Batostomella Ulrich.
nome of authors (not Goldfuss)=Pinnatopora Vine.
dictya Nicholson=Ptilodictya Lonsdale.
ialia Hall (in part)=Fistulipora McCoy.
orella Simpson=Lyropora Hall.
oridra Simpson=Lyropora Hall.
orina Simpson=Lyropora Hall.
ipora McCoy. Not recognized.
lsonia Davis=Hederella Hall.
lsonia Waagen and Wentzel=Escharopora Hall.
otrypa Hall=Buskopora Ulrich.

Omniretepora D'Orbigny. Not recognized.
Orbitulites Eichwald (preoccupied). Now Orbipora Eichwald.
Penniretepora D'Orbigny. Not recognized.
Pileotrypa Hall=Eridopora Ulrich.
Pinnaporella Simpson (1895)=Ptiloporina Hall.
Pinnaporella Simpson (1897)=Ptiloporella Hall.
Pinnaporina Simpson=Ptiloporina Hall.
Polyporella Simpson=Polypora McCoy.
Protoretepora De Koninck=Polypora McCoy.
Pteropora Hall=Tæniopora Nicholson.
Ptilionella Hall=Reptaria Rolle.
Ptychonema Hall and Simpson=Monotrypa Nicholson.
Reteporella Simpson=Reteporidra.
Rosacilla Roemer=Berenicea Lamouroux.
Sagenella Hall=Berenicea Lamouroux.
Stictocella Simpson=Cystodictya Ulrich.
Stictoporidra Simpson=Tæniopora Nicholson.
Subretepora D'Orbigny. Not recognized.
Tabulipora Young=Stenopora Lonsdale.
Tectulipora Hall=Loculipora Hall.
Tectuliporella Simpson=Isotrypa Hall.
Thamnocella Simpson=Drymotrypa Ulrich.
Thamnopora Hall (preoccupied). Now Thamnotrypa Hall.
Tubuliclidia Lonsdale=Stenopora Lonsdale.

DISTRIBUTION.

GEOGRAPHIC DISTRIBUTION

The most favored part of the earth for reading Paleozoic history is the continent of North America. On this continent the deposition of sediments proceeded under such fortunate conditions in the Paleozoic ages and the sediments have since been so little disturbed that their succession is easily made out. A large inland sea occupied the interior of the continent flanked on the east and west by more or less continuing barriers. The wide area of this sea, coupled with its comparative shallowness, provided conditions highly favorable for an abundant marine life, and especially for bryozoa. In the region of the eastern barrier, now the eastern highland of the continent, judging from the fossil remains hitherto made known, the conditions were often, perhaps generally, unfavorable for bryozoan life and only locally are the remains of this class found in the Paleozoic rocks of the Appalachian region; but the wide sea stretching for a thousand or more miles westward from the eastern barrier, gradually filling with the detritus from the earlier-formed or primeval rocks, supported a wealth of marine forms, among which the bryozoa formed a leading element.

The Eurasian land mass presents many surface exposures of Paleozoic age, but they are to a greater or less extent disconnected. In Asia the Salt Range of India has yielded Carboniferous bryozoa with its other fossils. The region of the Ural Mountains, the regions bordering upon the Baltic Sea, England, and Scotland, contain most of the Paleozoic strata which have thus far yielded bryozoa. Three or four times as many species have been made known from North America as from all the rest of the world.

The earliest bryozoa, so far as we now know, are in the Chazy. They are few in numbers, but this may be because they have not been systematically collected and studied.

The Trenton period, in all its subdivisions, Stones River (Birdseye), Black River, and Trenton proper (including the Galena), is a vast tomb of bryozoa. The seas seem to have swarmed with these minute creatures. In eastern Canada and New York, thence stretching through Ontario to the northwest into Wisconsin, Minnesota, and Manitoba, are deposits following roughly the outline of the northern or northeastern border of the interior sea. Deposits formed along what was soon to appear as an island or islands—the Cincinnati anticline—are also open to our inspection in Kentucky and Tennessee. At isolated points in Illinois and Missouri Trenton deposits are also exposed. Also isolated tracts of early Silurian times are exposed in the western highland. The Trenton is preeminently a continental formation. Scarcely anywhere between the two highlands does the drill fail to show Trenton if sent deep enough.

The succeeding period, the Cincinnati—by some authors still termed the Hudson River group, though the name seems to be a misnomer—is again a formation of continental extent, in which bryozoa flourished. The deposits in eastern New York along the Hudson River, supposedly of this age, have yielded no bryozoa and few other fossils. The Utica shale and the Lorraine and Pulaski shales and sandstones in the region of the Mohawk Valley and southeast of Lake Ontario were formed under conditions not generally propitious for bryozoa. But in the interior, in the region of the Cincinnati anticline, conditions were congenial and bryozoa flourished. Ohio, Kentucky, Indiana, and some limited areas in Illinois, Minnesota, Wisconsin, and Iowa, all yield well-preserved bryozoa and usually in great abundance. Outcrops occur also in Canada and as far east as Anticosti Island, in the gulf of St. Lawrence.

The Upper Silurian deposits in this country are exposed rather locally. Many of them were formed under conditions which precluded bryozoan life, but in some bryozoa are exceedingly abundant. From the Medina and Waterlime no bryozoa have been made known. The Clinton has yielded a considerable number both in New York and in Ontario, as well as around the borders of the Cincinnati anticline, but they are seldom finely preserved. The Niagara deposits are generally of a character unfavorable to the preservation of its fauna, but there are two good exceptions—an area in western New York, typically exposed at Lockport, and one in the vicinity of Waldron, Indiana.

The Lower Helderberg, succeeding the Niagara, is local in its distribution. But its exposures in Albany and Schoharie counties, New York, have yielded a large number of bryozoa, which, however, are not favorably preserved for microscopic study. By some writers the Lower Helderberg is considered Devonian. Its bryozoan fauna indicates relationship about equally with both Niagara and Upper Helderberg.

The Devonian age was ushered in by conditions unfavorable for bryozoan life. The Onondaga and Saliferous have yielded no bryozoa. The Upper Helderberg, in a belt extending from eastern New York west into Ontario, has proved rather prolific. The succeeding formation, the Hamilton, is preeminently a bryozoan epoch. In western New York, Ontario, Michigan, Manitoba, and Iowa its deposits are characterized generally by an abundance of bryozoa in a good state of preservation. A coral reef in the ancient sea, now forming the obstruction in the Ohio River at the Falls of the Ohio, afforded a hospitable abode for immense numbers of bryozoa. The later formations of the Devonian, best displayed in New York and Pennsylvania, have yielded very few bryozoa. None have yet been described.

For the early part of the Carboniferous age the name Mississippian seems to be gradually displacing in this country the terms Subcarboniferous and Lower Carboniferous, which have been so variously used that their use now produces ambiguity. The Mississippian series is characterized in North America by limestone formations, mainly located in the Mississippi Valley, though deposits also occur, not so sharply differentiated, in the trough between the Cincinnati anticline and the eastern highland, to which such local names as Waverly, Marshall, and Maxville limestone have been applied. Being limestone formations, they are, as might be expected, very prolific of bryozoa, some, however, much less so than others. The earlier formations, the Kinderhook and Burlington, also have yielded but a limited number of bryozoa, but this may be due to the comparatively limited areas of outcrop and to lack of systematic collecting.

In the Coal Measures conditions producing brackish or fresh water and marine formations alternated irregularly. Naturally, marine fossils are quite local in occurrence. But among the marine fossils bryozoa hold their place extremely well, though they are much reduced from the opulence of the Mississippian series in kinds and numbers.

By the close of the Coal Measures the interior sea had been wellnigh effaced, and in the West and Southwest only—Kansas and Texas—do we find Permian deposits of any considerable extent. But few bryozoa are known from these deposits; whether this is due to their absence or to lack of collecting we do not know.

During later geological times marine deposits in this country are limited to the Atlantic and Gulf Coastal Plain, to a few favored areas in the Great Plains and Rocky Mountain regions, and the territory bordering the Pacific. Comparatively few bryozoa of later age have been made known, though the indications are that a large number of species will be the reward of thorough collecting. In central and southern Europe Mesozoic and Tertiary beds often abound in bryozoa.

GEOLOGIC DISTRIBUTION.

Though the materials for the history of the biologic and phylogenetic development of the Paleozoic bryozoa are to be found in the rocks of the North American continent, scarcely a beginning has yet been made. Before this history can be written with any degree of correctness, the preliminary work of collecting, studying, classifying, and comparing the faunas of successive formations must be well under way. This work is still in its infancy. The only worker in this field who has yet cared to do any generalizing is Mr. E. O. Ulrich, and he has not ventured very far.

A study of the tables given farther on will afford some indications of the rich results which the future may be expected to bring. It is not possible to use the numbers there given determinatively for generalizations, for while the tables give the numbers of all species and genera thus far described and recognized as valid, there remains in various collections, public and private, a very large number of undescribed species and some new genera. Therefore, any conclusions based upon the numbers in the tables can at best be merely tentative.

No bryozoa have yet been known from the Cambrian, or the lowest of the Ordovician formations—the Calciferous. Whether this means that they are actually absent, or that they are so rare as not yet to have fallen under collectors' eyes, can not be said. From the Chazy rocks come the oldest unequivocal bryozoa, three species of Phyllopora, one of Rhinidictya, and one of Stictopora, all cryptostomatous genera, with indications of the presence of some Trepostomata. It is probable that future collecting will very much increase this meager list, though good localities seem to be rare.

In the Trenton period the bryozoa occur in the greatest profusion. The few Chazy forms have multiplied, as if by magic, into the large Trenton fauna. One of the missing links in paleontological history doubtless occurs at this point. The Trenton formation stands second in the number of described species, though it will probably in the end lead. Not less than 80 species are known that await description. The Trepostomata form half the fauna. The Cryptostomata rank next. The latter soon became and continued the predominant type of the Paleozoic eon, yielding their supremacy in later times to the Chilostomata, which are represented doubtfully in the Paleozoic seas by the single genus Paleschara. In the Trenton the Cyclostomata are fairly well represented—the Ctenostomata scarcely at all—but this may be because ctenostomatous bryozoa rarely admit of preservation as fossils. Of the Ctenostomata only six species have been described, all Eopaleozoic; but about twenty other undescribed species are known, some of which are from Neopaleozoic formations. Among the Cyclostomata the Ceramoporidæ and Diastoporidæ predominate during the Trenton, the Monticuliporidæ and Trematoporidæ among the Trepostomata, the Arthrostylidæ and Rhinidictyonidæ among the Cryptostomata.

The succeeding period, the Cincinnati, is very similar to its predecessor in its bryozoan fauna, the various suborders maintaining about the same relative representation. About one hundred undescribed species are known, and it is probable that many species still await discovery. The predominant families are the Ceramoporidæ among the Cyclostomata, the Monticuliporidæ and Heterotrypidæ among the Trepostomata, and the Ptilodictyonidæ and Rhinidictyonidæ among the Cryptostomata.

The Anticosti group forms the connecting link between the Ordovician and Silurian eras. In this formation the Trepostomata will be found fairly numerous. A few species have been described by Billings, but were so meagerly characterized that we are unable to place them generically, and hence have omitted them from our tables. The Cryptostomata appear to predominate, though when the fauna shall have been thoroughly studied the Trepostomata may be found to be still slightly in the lead.

From the Medina, which is practically limited to the State of New York, no bryozoa have been made known. The Clinton contains but few bryozoa, and these are generally not well preserved. The Trepostomata have now dropped from first to second place, the Cryptostomata are very much in the lead, the Cyclostomata rare. The Ptilodictyonidæ now reach their maximum and are the predominant family both in number of species and in individuals.

With the Niagara a decided change has come. Large forms are comparatively rare; even among the Trepostomata the tendency to diminutiveness is very noticeable. The Cryptostomata greatly predominate; the Cyclostomata and Trepostomata are about equally represented. The Ceramoporidæ are giving place to the Fistuliporidæ, probably their descendants. Among the Trepostomata the Batostomellidæ, the most enduring family of the bryozoa in Paleozoic time, predominate. Among the Cryptostomata the Fenestellidæ lead, and from this time on are the chief family.

The Lower Helderberg is similar in its bryozoan fauna to the Niagara, but the Fenestellidæ have been increasing rapidly and now form nearly one-third of the bryozoa. No Cyclostomata except those belonging to the Fistuliporidæ and Ceramoporidæ have been recorded.

The Upper Helderberg fauna emphasizes the tendency begun in the Niagara and strengthened in the Lower Helderberg—namely, the diminution of the Trepostomata and the augmentation of the Cryptostomata. The Trepostomata are now of little importance; the Fenestellidæ far outweigh all other families and constitute considerably over one-half the fauna.

The Hamilton fauna excels all others at present in the number of described species and genera represented. Probably a large amount of synonymy still exists which time will eliminate. However, future discoveries will probably disclose a number of new species more than sufficient to offset the loss by reduction from synonyms. The Trepostomata are the least important element, and are about ready to disappear. Naturally they present a jumble of features which makes them difficult to classify along with those of Eopaleozoic age. The Fistuliporidæ have become wonderfully numerous in species and genera. The Batostomellidæ are at their maximum; so also are the Fenestellidæ. The Falls of the Ohio has proved, probably, to be the most prolific single locality for bryozoa in the world. The Cystodictyonidæ are also at their maximum. In fact, the Hamilton may be said to mark the culmination of Paleozoic bryozoa.

In the interval between the Hamilton and the Osage, the next formation in which the bryozoa form a large element of the fauna, several formations were laid down under conditions commonly unfavorable for bryozoan life, though future collections may materially alter this conclusion. The earliest of the Mississippian series, the Kinderhook, has thus far shown but few bryozoa. The earlier of the Osage formations, the Burlington, has also thus far proved poor collecting ground, but the Keokuk and Warsaw, following, have an abundant bryozoan fauna. At Warsaw, Ill., the Warsaw formation bears a close relationship to the Keokuk fauna, but at other points the Warsaw seems more closely allied to the St. Louis, following it, than to the Keokuk, preceding. In these formations the Cryptostomata are monopolists, but few Cyclostomata and Trepostomata occurring. So it continues throughout the Mississippian series. The Fenestellidæ continue to be the predominant family. As is the case in other tribes of the animal kingdom, when a type of structure culminates, the family evolves a great many variations, some curious, and even grotesque, ere it reaches its extinction. The St. Louis, an almost solid limestone formation, has not been favorable for the preservation of bryozoa. The Ste. Genevieve, which differs from the St. Louis in having less limestone and more shale, has a considerable bryozoan fauna, with the Fenestellidæ still much in excess of the other groups. In the Chester the Fenestella type produces two curious genera in form of growth, the Lyropora and Archimedes, both of which must have been beautiful objects when living.

It might be expected that the Coal Measures, from the mode of their formation, would not yield many bryozoa. Not many individuals comparatively have been found, yet 62 species assigned to 15 genera have been recorded. The Fenestellidæ are still the most numerous. The Permian, perhaps because it has been but little investigated, has but few species. The close of the Paleozoic sees the extinction of its bryozoan fauna. The next fauna in America, the bryozoa from the Cretaceous marl of New Jersey, wears an entirely different facies. The Trepostomata and Cryptostomata are scarcely, if at all, represented; the Cyclostomata are numerous, and the Chilostomata even more so.

LIST OF LOCALITIES.

The following list gives the principal localities from which bryozoa have been recorded. The asterisk (*) has been placed before the most important and typical localities.

ORDOVICIAN.

CHAZY.

Canada.—Mingan.
Vermont.—Granville.
New York.—*Chazy, Galway.

TRENTON.

STONES RIVER (BIRDSEYE) DIVISION.

Lake Huron.—St. Joseph Island.
New York.—*Watertown.
Illinois.—*Dixon and Calhoun County.
Wisconsin.—Mineral Point, Janesville, Beloit.
Minnesota.—*Minneapolis, *St. Paul, *Cannon Falls, Chatfield, Fountain, Lanesboro, Preston.
Kentucky.—*High Bridge, Frankfort.
Tennessee.—Knoxville, *Lebanon, *Murfreesboro, Shelbyville, Lavergne, Columbia, Franklin.

BLACK RIVER DIVISION.

New York.—Watertown, Chazy.
Wisconsin.—Beloit.
Minnesota.—*Minneapolis, *St. Paul; Cannon Falls, Fountain, Preston, Lanesboro, and other localities in Goodhue and Fillmore counties.
Iowa.—Decorah.
Illinois.—Rockton.

TRENTON DIVISION.

Quebec.—Montreal, Joliette, Quebec.
Ontario.—*Ottawa, *Peterborough, Belleville.
Vermont.—Chimney Point, Bridport.
New York.—*Trenton Falls, Middleville, Jacksonburg, *Watertown, Lowville, Turin, Little Falls, Chazy.

Manitoba.—St. Andrews, East Selkirk; Big, Deer, and Little Black islands, in Lake Winnipeg.

Minnesota.—*St. Paul, *Cannon Falls, Kenyon, Berne, Hader, Mantorville, and localities in Ramsay, Goodhue, Olmstead, and Fillmore counties.

Michigan.—Escanaba River.

Wisconsin.—Neenah.

Illinois.—Rockton, Calhoun County, Alexander County (Thebes).

Kentucky.—*Covington, *Burgin, *Frankfort, Harrodsburg, Paris, Georgetown, Lexington, Nicholasville, Danville, Colby, Mercer County, Garrard County.

Tennessee.—*Nashville, Franklin, Mt. Pleasant, and many other localities in the central basin.

Nevada.—Silver Canyon, Pahranagat Range.

CINCINNATI.

UTICA DIVISION.

Canada.—Ottawa.

New York.—Utica, Rome.

Ohio.—*Cincinnati, Milford, Loveland, Batavia.

Indiana.—Numerous localities in the southeastern corner of the State.

Kentucky.—*Covington, *Newport, Maysville, Augusta, Frankfort, Harrodsburg.

Iowa.—Graf, Lantnerville.

Minnesota.—Fillmore County.

LORRAINE DIVISION.

Ontario.—Toronto, Weston, River Credit.

New York.—Turin, Lorraine, Pulaski.

Ohio.—*Cincinnati, *Hamilton, *Lebanon, Mason, Morrow, Loveland, and other localities in Hamilton, Clermont, Warren, and Butler counties.

Indiana.—Numerous localities in the southeastern part of the State.

Kentucky.—*Covington, *Newport, Maysville, McKinneys, and many localities in Boyle, Lincoln, and other counties in the central part of the State.

Tennessee.—*Nashville, *Columbia, Mt. Pleasant, Swan Creek, and many localities in middle Tennessee.

RICHMOND DIVISION.

Anticosti Island (*Gulf of St. Lawrence*).

Ontario.—Toronto, Oakville, ?Weston.

Ohio.—*Blanchester, Westboro, *Oregonia, *Waynesville, Middletown, *Oxford, Clarksville, Hanover, Camden, Jacksonburg, Lynchburg, and other localities in Highland, Brown, Clinton, Warren, and Butler counties.

Indiana.—*Richmond, *Versailles, Osgood, Weisburg, and other localities in the southeastern part of the State.

Kentucky.—*Lebanon, Raywick, Mount Washington, Richmond, and localities in Marion, Washington, and Nelson counties.

Illinois.—*Wilmington, Savannah, Sterling, South Elgin.

Wisconsin.—Delafield, Iron Ridge.

Minnesota.—Spring Valley.

Manitoba.—Stony Mountain.

SILURIAN (UPPER).

ANTICOSTI.

Anticosti Island (*Gulf of St. Lawrence*).—The lower part of the Anticosti occupies the interval between the Richmond and the Clinton, probably contemporaneous with the Medina. The upper part is the equivalent of the Clinton.

CLINTON.

Ontario.—Flamborough Head, Dundas, *Hamilton.

New York.—Wayne County.

Tennessee.—Cumberland Gap.

Alabama.—Collinsville.

Ohio.—*Dayton, *Eaton, Centreville, *Fair Haven, near New Carlisle, Belfast Todds Fork, and other localities in Clinton and Preble counties.

Indiana.—Hanover.

NIAGARA.

Ontario.—Hamilton, Thorold, Flamborough Head.

New York.—*Lockport, Rochester, Reynales Basin, Gasport.

Ohio.—Cedarville.

Indiana.—*Waldron, *Osgood.

Illinois.—Sterling, Savannah, South Elgin, Chicago.

Tennessee.—Localities in Perry, Hardin, Hickman, and Wayne counties.

LOWER HELDERBERG.

New York.—* Clarksville, * Schoharie, Catskill.

Tennessee.—Localities in Perry and Hickman counties.

DEVONIAN.

ORISKANY (?).

None recorded except from the Gaspé Limestone at Indian Cove, Gaspé Bay, and Grand Creve, Canada.

UPPER HELDERBERG (CORNIFEROUS).

New York.—Onondaga Valley, Cherry Valley, near Caledonia, Stafford, Schoharie, Thompsons Lake (Albany County), Waterville, Falkirk, near Buffalo, * Le Roy.

Ontario.—Port Colborne, Port Jarvis, * Walpole, Wainfleet.

Ohio.—Sandusky, Columbus, Sylvania, Marblehead, Whitehouse (Lucas County).

HAMILTON.

New York.—Cazenovia, near Leonardsville, New Berlin, Delphi, Nortons Landing (Cayuga Lake), Owasco Lake, Lodi Landing (Seneca Lake), Bellona, Hopeton (Yates County), * Canandaigua, Monteiths Point (Lake Canandaigua), Fall Brook, near Lake Canandaigua, West Bloomfield, near Muttonville (Ontario County), * Moscow, * York, near Geneseo, Darien Center, Pavilion, * West Hamburg, Alden, * Eighteen-mile Creek, and other localities in Cayuga, Seneca, Ontario, Livingston, and Erie counties.

Ontario.—* Widder (now Thedford), Arkona, Bartletts Mills, West Williams.

Canada.—Lake Winnepegosis, Hay River, Athabasca River, near Dawson Bay, Red Deer River.

Michigan.—* Alpena, Thunder Bay Island, Partridge Point (near Alpena), * Petoskey.

Indiana.—Utica, * Falls of the Ohio.

Illinois.—Rock Island, Andalusia.

Iowa.—* Buffalo, Davenport, Muscatine, Independence, Hackberry, Rockford, Iowa City.

Wisconsin.—Milwaukee.

Missouri.—Calloway County.

MISSISSIPPIAN.

KINDERHOOK.

Iowa.—Marshalltown.

BURLINGTON.

Iowa.—Burlington.

Illinois.—Quincy, Montezuma, Sagetown (Henderson County), Calhoun County.

WAVERLY (=KINDERHOOK TO KEOKUK).

Ohio.—Lodi, Richfield, Sciotoville, Newark, Burbank, Moots Run, Cuyahoga County.

Michigan.—Hillsdale.

KEOKUK.

Illinois.—*Nauvoo, Warsaw, near Whitehall, Jersey County, near Plymouth, Greene County, Appanoosa (near Quincy).

Iowa.—* Keokuk, * Bentonsport.

Missouri.—Lagrange, St. Francisville, Clark County.

Kentucky.—* Kings Mountain, near Somerset, Button Mole Knob (near Louisville).

WARSAW.

Indiana.—Spergen Hill.

Illinois.—*Warsaw, Columbia and other localities in Monroe County, near New Providence.

Missouri.—Barrett's (St. Louis County), Curryville.

ST. LOUIS.

Illinois.—Alton, Waterloo, Prairie du Rocher.

Missouri.—St. Louis, Ste. Genevieve.

Kentucky.—Eddyville, Elizabethtown, Somerset, Colesburg, and other localities in Caldwell, Lyon, and Crittenden counties.

Tennessee.—Clarksville.

West Virginia.—Between Fort Springs and Ronceverte.

STE. GENEVIEVE.

Iowa.—Pella.

Missouri.—Ste. Genevieve.

Illinois.—Rosiclare.

Kentucky.—Princeton, Cerulean Springs, and other localities in Trigg and Caldwell counties.

CHESTER.

Ohio.—Newtonville.

Illinois.—*Chester, Kaskaskia (now Fort Gage), *Red Bud, Ruma, Baldwin, Rockwood, Anna.

Kentucky.—*Sloans Valley (or Tateville), Grayson Springs, Litchfield, Stephensport, Smithland, and localities in Crittenden, Caldwell, Livingston, Meade, Pulaski, and Jackson counties.

Alabama.—Huntsville.

CARBONIFEROUS.

COAL MEASURES.

[illegible] Ridge, Bald Hill.
[illegible] Knox County, Peoria, Danville, Springfield and [illegible]
[illegible] County, Caseyville, Sparta, near Centralia, and localities
[illegible] and Fayette counties.
[illegible]
[illegible]
[illegible] Wyoming.
[illegible] Riley, Greenwood County.
[illegible] Mountain

PERMIAN.

[illegible] other unrecorded localities.
[illegible] Mountains, Jornada de Muerto.

[illegible] division not specified.)

[illegible]
[illegible]
[illegible]
[illegible] White Mountain and Black rivers.
[illegible]

CRETACEOUS.

[illegible] Browsville, Vincentown.
[illegible]
[illegible] of Little Rock.

EOCENE.

[illegible]
[illegible] Virginia and other localities.
[illegible]
[illegible]
[illegible]
[illegible]

MIOCENE.

[illegible]
[illegible] Yorktown, Carter's Landing.

PLIOCENE.

[illegible] River, Smith's on
[illegible] Gabb and
[illegible]
[illegible]

POST-PLIOCENE.

[illegible] Journal Academy Natural
[illegible]
[illegible]

SUCCESSION OF BRYOZOAN FAUNAS.

The subjoined table is designed to show the succession of bryozoan faunas. The formations in the same column do not always have the same taxonomic rank, as now generally regarded. It is to be noted that usage in such matters is not uniform and is probably in a transitional stage.

Table showing the occurrence of bryozoa by formations.

Neocene	Pliocene		Not many known in North America; very abundant in Europe.
	Miocene		
Eocene			
Cretaceous			A moderate number known.
Juratrias			None known.
Carboniferous	Permian		A limited number.
	Upper Coal Measures		A fair number.
	Lower Coal Measures		
	Conglomerate		None known.
Mississippian	Chester	Upper	Abundant.
		Middle (Lyropora beds)	
		Lower (Kaskaskia limestone).	
		Big Clifty (=Aux Vases) sandstone.	None known.
	St. Louis	Ste. Genevieve limestone	A fair number.
		St. Louis limestone	Rather few.
		Warsaw beds	Abundant.
	Osage	Keokuk	
		Upper Burlington	Few.
		Lower Burlington	
	Kinderhook	Choteau limestone	Very few known.
		Hannibal shale	
		Louisiana limestone	
Devonian	Chemung		Very few known.
	Hamilton		Abundant.
	Upper Helderberg		
	Oriskany		Very few known.
Silurian (Upper)	Lower Helderberg		Abundant.
	Onondaga		None known.
	Niagara	Lockport[1]	Abundant.
		Rochester[1]	
		Clinton and Anticosti	A moderate number.
		Medina	None known.
Ordovician	Cincinnati	Richmond	Very abundant.
		Lorraine	
		Utica	
	Trenton	Trenton	
		Black River	
		Stones River	
	Chazy		A few known.
	Calciferous		None known.
Cambrian			Do.

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[1] Names adopted by the United States Geological Survey for formations formerly called Niagara limestone and Niagara shale, respectively. In this work the term Niagara refers to these two formations taken together and excluding Clinton and Medina.

LISTS OF SPECIES.

CHAZY.

Phylloporina aspera (Hall).
gracilis (Hall).
incepta (Hall).
Rhinidictya fenestrata (Hall).
Stenopora ?? adherens Billings.
?? patula Billings.
Stictopora ? glomerata Hall.

TRENTON.

	Stones River.	Black River.	Trenton.
Amplexopora ? discoidea (Nicholson)			×
Anolotichia impolita (Ulrich)	×		
Arthroclema armatum Ulrich			×
billingsi Ulrich			×
cornutum Ulrich		×	
pulchellum Billings			×
striatum Ulrich		×	
Arthropora bifurcata Ulrich		×	
reversa Ulrich			×
simplex Ulrich	×	×	
Arthrostylus conjunctus Ulrich		×	
obliquus Ulrich	×		
tenuis (James)			×
Aspidopora calycula (James)			×
elegantula Ulrich			×
parasitica Ulrich	×	×	
Atactoporella ? crassa Ulrich			×
insueta Ulrich		×	
ramosa Ulrich		×	
typicalis-præcipta Ulrich		×	
Batostoma canadense (Foord)		×	×
? decipiens Ulrich	×	×	
fertile Ulrich	×		
fertile-circulare Ulrich	×		
humile Ulrich			×
magnoporum Ulrich		×	
minnesotense Ulrich		×	
montuosum Ulrich		×	
superbum (Foord)			×
varium Ulrich		×	
winchelli (Ulrich)		×	
winchelli-nodosum Ulrich		×	
winchelli-spinulosum Ulrich		×	
Berenicea minnesotensis Ulrich	×	×	

Lists of species—Continued.

TRENTON—Continued.

	Stones River.	Black River.	Trenton.
Bythopora alcicornis Ulrich	....	×	....
herricki Ulrich	....	×	....
Bythotrypa laxata (Ulrich)	×	×	×
Callopora ampla Ulrich	....	×	×
angularis Ulrich	×	....	....
? crenulata Ulrich	....	×	×
dumalis Ulrich	×	×	....
goodhuensis Ulrich	....	....	×
incontroversa Ulrich	×	....	....
multitabulata (Ulrich)	....	×	×
pulchella Ulrich	....	×	....
pulchella-persimilis Ulrich	....	×	....
undulata Ulrich	....	×	....
Ceramophylla frondosa Ulrich	....	×	....
Ceramoporella inclusa Ulrich	×	×	×
interporosa Ulrich	....	....	×
Chætetes ?? rugosus Hall	....	....	×
Cœloclema trentonense (Ulrich)	....	....	×
Constellaria fischeri Ulrich	....	....	×
varia Ulrich	....	....	×
Crepipora perampla Ulrich	×	....	....
simulans Ulrich	....	....	×
spatiosa Ulrich	....	....	×
subæquata Ulrich	....	×	....
venusta (Ulrich)	....	....	×
Dekayella prænuntia Ulrich	....	×	....
prænuntia-echinata Ulrich	....	×	....
prænuntia-multipora Ulrich	....	×	....
prænuntia-nævigera Ulrich	....	×	....
prænuntia-simplex Ulrich	×	×	....
trentonensis (Ulrich)	....	....	×
Diastoporina flabellata Ulrich	....	....	×
Diploclema trentonense Ulrich	....	....	×
Diplotrypa limitaris Ulrich	....	....	×
neglecta Ulrich	....	....	×
westoni Ulrich	....	....	×
Drymotrypa dichotoma Ulrich	....	....	×
Eridotrypa briareus (Nicholson)	....	....	×
exigua Ulrich	....	....	×

Lists of species—Continued.

TRENTON—Continued.

	Stones River.	Black River.	Trenton.
Eridotrypa mutabilis Ulrich			×
mutabilis-minor Ulrich			×
trentonensis (Nicholson)			×
Escharopora angularis Ulrich	×		
briareus (Ulrich)	×		
confluens Ulrich		×	
libana (Safford)	×		
? limitaris Ulrich	×	×	
ramosa (Ulrich)	×		
recta Hall			×
recta-nodosa Hall			×
subrecta (Ulrich)		×	
Eurydictya calhounensis Ulrich			×
multipora (Hall)		×	×
Helopora alternata Ulrich		×	
divaricata Ulrich	×		
mucronata Ulrich			×
quadrata Ulrich			×
spiniformis (Ulrich)	×		
Hemiphragma irrasum (Ulrich)	×	×	×
ottawense (Foord)		×	×
tenuimurale Ulrich			×
Homotrypa ? arbuscula Ulrich	×		
callosa Ulrich			×
exilis Ulrich	×		
? intercalaris Ulrich		×	
minnesotensis Ulrich	×	×	
minnesotensis-montifera Ulrich		×	
separata Ulrich	×		
? similis Foord			×
subramosa Ulrich		×	
subramosa-insignis Ulrich			×
tuberculata Ulrich		×	
Homotrypella granulifera (Ulrich)			×
instabilis Ulrich		×	
multiporata Ulrich		×	
mundula Ulrich			×
? ovata Ulrich		×	×
? subgracilis Ulrich		×	

Lists of species—Continued.

TRENTON—Continued.

	Stones River.	Black River.	Trenton.
Leptotrypa ? acervulosa Ulrich			×
? claviformis Ulrich		×	
? hexagonalis Ulrich	×		
informis Ulrich	×		
Mesotrypa discoidea Ulrich			×
infida (Ulrich)		×	
quebecensis (Ami)			×
regularis (Foord)			×
? rotunda Ulrich			×
selkirkensis Whiteaves			×
? spinosa Ulrich		×	
whiteavesi (Nicholson)			×
Mitoclema cinctosum Ulrich	×		
? mundulum Ulrich			×
Monotrypa cumulata Ulrich			×
intabulata Ulrich			×
magna Ulrich	×		
rectimuralis Ulrich			×
undulata (Nicholson)			×
Monticulipora arborea Ulrich			×
billingsi Foord			×
? cannonensis Ulrich		×	×
incompta Ulrich		×	
westoni Foord			×
wetherbyi Ulrich	×		
Nematopora alternata Ulrich			×
conferta Ulrich			×
delicatula Ulrich			×
fragilis Ulrich			×
granosa Ulrich			×
ovalis Ulrich			×
retrorsa Ulrich			×
Nicholsonella laminata Ulrich		×	
ponderosa Ulrich	×		
pulchra Ulrich	×		
Pachydictya acuta (Hall)			×
elegans Ulrich			×
everetti Ulrich	×		
fimbriata Ulrich		×	

Lists of species—Continued.

TRENTON—Continued.

	Stones River.	Black River.	Trenton.
Pachydictya foliata Ulrich	×		
magnipora Ulrich			×
occidentalis Ulrich		×	
pumila Ulrich			×
pumila-sublata Ulrich			×
robusta Ulrich	×		
triserialis Ulrich			×
Phacelopora pertenuis Ulrich			×
Phænopora incipiens Ulrich			×
Phyllodictya frondosa Ulrich	×		
varia Ulrich		×	
Phylloporina corticosa (Ulrich)			×
dawsoni Ulrich			×
fenestrata (Hall)			×
granistriata Ulrich			×
halli Ulrich		×	
reticulata (Hall)		×	×
sublaxa Ulrich	×		
trentonensis (Nicholson)			×
Prasopora affinis Foord			×
conoidea Ulrich		×	
contigua Ulrich		×	
grandis (Ulrich)	×		×
insularis Ulrich			×
insularis-filmorensis Ulrich			×
lenticularis Ulrich		×	
nodosa Ulrich			×
oculata Foord			×
selwyni (Nicholson)			×
simulatrix Ulrich		×	×
simulatrix-orientalis Ulrich			×
Proboscina tumulosa Ulrich		×	
Protocrisina exigua Ulrich			×
Rhinidictya basalis (Ulrich)	×		
exigua Ulrich	×	×	
fidelis Ulrich	×		
grandis Ulrich	×		
minima Ulrich			×
minima-modesta Ulrich			×

Lists of species—Continued.

TRENTON—Continued.

	Stones River.	Black River.	Trenton.
Bythopora alcicornis Ulrich		×	
herricki Ulrich		×	
Bythotrypa laxata (Ulrich)	×	×	×
Callopora ampla Ulrich		×	×
angularis Ulrich	×		
? crenulata Ulrich		×	×
dumalis Ulrich	×	×	
goodhuensis Ulrich			×
incontroversa Ulrich	×		
multitabulata (Ulrich)		×	×
pulchella Ulrich		×	
pulchella-persimilis Ulrich		×	
undulata Ulrich		×	
Ceramophylla frondosa Ulrich		×	
Ceramoporella inclusa Ulrich	×	×	×
interporosa Ulrich			×
Chætetes ?? rugosus Hall			×
Cœloclema trentonense (Ulrich)			×
Constellaria fischeri Ulrich			×
varia Ulrich			×
Crepipora perampla Ulrich	×		
simulans Ulrich			×
spatiosa Ulrich			×
subæquata Ulrich		×	
venusta (Ulrich)			×
Dekayella prænuntia Ulrich		×	
prænuntia-echinata Ulrich		×	
prænuntia-multipora Ulrich		×	
prænuntia-nævigera Ulrich		×	
prænuntia-simplex Ulrich	×	×	
trentonensis (Ulrich)			×
Diastoporina flabellata Ulrich			×
Diploclema trentonense Ulrich			×
Diplotrypa limitaris Ulrich			×
neglecta Ulrich			×
westoni Ulrich			×
Drymotrypa dichotoma Ulrich			×
Eridotrypa briareus (Nicholson)			×
exigua Ulrich			×

Lists of species—Continued.

TRENTON—Continued.

	Stones River.	Black River.	Trenton.
Eridotrypa mutabilis Ulrich			×
mutabilis-minor Ulrich			×
trentonensis (Nicholson)			×
Escharopora angularis Ulrich	×		
briareus (Ulrich)	×		
confluens Ulrich		×	
libana (Safford)	×		
? limitaris Ulrich	×	×	
ramosa (Ulrich)	×		
recta Hall			×
recta-nodosa Hall			×
subrecta (Ulrich)		×	
Eurydictya calhounensis Ulrich			×
multipora (Hall)		×	×
Helopora alternata Ulrich		×	
divaricata Ulrich	×		
mucronata Ulrich			×
quadrata Ulrich			×
spiniformis (Ulrich)	×		
Hemiphragma irrasum (Ulrich)	×	×	×
ottawense (Foord)		×	×
tenuimurale Ulrich			×
Homotrypa ? arbuscula Ulrich	×		
callosa Ulrich			×
exilis Ulrich	×		
? intercalaris Ulrich		×	
minnesotensis Ulrich	×	×	
minnesotensis-montifera Ulrich		×	
separata Ulrich	×		
? similis Foord			×
subramosa Ulrich		×	
subramosa-insignis Ulrich			×
tuberculata Ulrich		×	
Homotrypella granulifera (Ulrich)			×
instabilis Ulrich		×	
multiporata Ulrich		×	
mundula Ulrich			×
? ovata Ulrich		×	×
? subgracilis Ulrich		×	

Lists of species—Continued.

TRENTON—Continued.

	Stones River.	Black River.	Trenton.
ptotrypa ? acervulosa Ulrich			×
? claviformis Ulrich		×	
? hexagonalis Ulrich	×		
informis Ulrich	×		
sotrypa discoidea Ulrich			×
infida (Ulrich)		×	
quebecensis (Ami)			×
regularis (Foord)			×
? rotunda Ulrich			×
selkirkensis Whiteaves			×
? spinosa Ulrich		×	
whiteavesi (Nicholson)			×
toclema cinctosum Ulrich	×		
? mundulum Ulrich			×
notrypa cumulata Ulrich			×
intabulata Ulrich			×
magna Ulrich	×		
rectimuralis Ulrich			×
undulata (Nicholson)			×
nticulipora arborea Ulrich			×
billingsi Foord			×
? cannonensis Ulrich		×	×
incompta Ulrich		×	
westoni Foord			×
wetherbyi Ulrich	×		
matopora alternata Ulrich			×
conferta Ulrich			×
delicatula Ulrich			×
fragilis Ulrich			×
granosa Ulrich			×
ovalis Ulrich			×
retrorsa Ulrich			×
holsonella laminata Ulrich		×	
ponderosa Ulrich	×		
pulchra Ulrich	×		
hydictya acuta (Hall)			×
elegans Ulrich			×
everetti Ulrich	×		
fimbriata Ulrich		×	

Lists of species—Continued.

TRENTON—Continued.

	Stones River.	Black River.	Trenton.
Pachydictya foliata Ulrich	×	....	....
magnipora Ulrich	....	....	×
occidentalis Ulrich	....	×	....
pumila Ulrich	....	....	×
pumila-sublata Ulrich	....	....	×
robusta Ulrich	×	....	....
triserialis Ulrich	....	....	×
Phacelopora pertenuis Ulrich	....	....	×
Phænopora incipiens Ulrich	....	....	×
Phyllodictya frondosa Ulrich	×	....	....
varia Ulrich	....	×	....
Phylloporina corticosa (Ulrich)	....	....	×
dawsoni Ulrich	....	....	×
fenestrata (Hall)	....	....	×
granistriata Ulrich	....	....	×
halli Ulrich	....	×	....
reticulata (Hall)	....	×	×
sublaxa Ulrich	×	....	....
trentonensis (Nicholson)	....	....	×
Prasopora affinis Foord	....	....	×
conoidea Ulrich	....	×	....
contigua Ulrich	....	×	....
grandis (Ulrich)	×	....	×
insularis Ulrich	....	....	×
insularis-filmorensis Ulrich	....	....	×
lenticularis Ulrich	....	×	....
nodosa Ulrich	....	....	×
oculata Foord	....	....	×
selwyni (Nicholson)	....	....	×
simulatrix Ulrich	....	×	×
simulatrix-orientalis Ulrich	....	....	×
Proboscina tumulosa Ulrich	....	×	....
Protocrisina exigua Ulrich	....	....	×
Rhinidictya basalis (Ulrich)	×	....	....
exigua Ulrich	×	×	....
fidelis Ulrich	×	....	....
grandis Ulrich	×	....	....
minima Ulrich	....	....	×
minima-modesta Ulrich	....	....	×

Lists of species—Continued.

TRENTON—Continued.

	Stones River.	Black River.	Trenton.
Rhinidictya mutabilis (Ulrich)	×	×	×
mutabilis-major (Ulrich)	....	×	....
mutabilis-senilis Ulrich	....	×	....
nashvillensis (Miller)	×	....	....
neglecta Ulrich	....	....	×
neglecta-canadensis Ulrich	....	....	×
nicholsoni Ulrich	×	....	....
paupera Ulrich	....	×	....
pediculata Ulrich	×	....	....
trentonensis (Ulrich)	×	....	....
Scenellopora radiata Ulrich	×	....	....
Spatiopora ? areolata Foord	....	....	×
labeculosa Ulrich	....	×	....
lineata-incepta Ulrich	....	×	....
Stellipora antheloidea Hall	....	....	×
Stictopora elegantula Hall	....	....	×
? labyrinthica Hall	×	....	....
? ramosa Hall	×	....	....
Stictoporella angularis Ulrich	×	....	....
angularis-intermedia Ulrich	×	....	....
cribrosa Ulrich	×	×	....
dumosa Ulrich	....	×	....
exigua Ulrich	....	....	×
flabellata (Hall)	....	....	×
frondifera Ulrich	×	....	....
rigida Ulrich	....	×	....
Stomatopora arachnoidea (Hall)	....	....	×
canadensis Whiteaves	....	....	×
delicatula (James)	×	×	×
inflata (Hall)	....	×	×
Stromatotrypa ovata Ulrich	×	×	....
Trematopora calloporoides Ulrich	....	....	×
debilis Ulrich	....	....	×
? primigenia Ulrich	....	×	....
? primigenia-ornata Ulrich	....	×	....
? primigenia-spinosa Ulrich	....	×	....
Trigonodictya conciliatrix Ulrich	....	×	....
Vinella repens Ulrich	....	×	....

Lists of species—Continued.

CINCINNATI.

	Utica.	Lorraine.	Rich-mond.
Amplexopora cingulata Ulrich		×	
? discoidea (Nicholson)		×	
filiosa (D'Orbigny)		×	
petasiformis (Nicholson)	×		
petasiformis-welchi (James)	×		
pustulosa Ulrich			×
robusta Ulrich		×	
septosa (Ulrich)	×	×	
Anolotichia ponderosa Ulrich			×
Arthroclema angulare Ulrich			×
Arthropora shafferi (Meek)		×	
shafferi-cleavelandi (James)	×		
Arthrostylus curtus Ulrich	×		
tenuis (James)	×		
Aspidopora areolata Ulrich	×		
eccentrica (James)	×		
newberryi (Nicholson)	×		
Atactopora hirsuta Ulrich	×	×	
maculata Ulrich		×	
Atactoporella multigranosa (Ulrich)		×	
mundula (Ulrich)		×	
newportensis Ulrich	×		
ortoni (Nicholson)		×	
schucherti Ulrich			×
tenella (Ulrich)		×	
typicalis Ulrich	×		
Batostoma implicatum (Nicholson)	×		
jamesi (Nicholson)	×		
manitobense Ulrich			×
? rugosum (Whitfield)			×
varians (James)			×
Berenicea primitiva Ulrich		×	×
vesiculosa Ulrich	×		
Bythopora arctipora (Nicholson)	×		
delicatula (Nicholson)			×
dendrina (James)		×	
gracilis (Nicholson)		×	
meeki (James)			×
parvula (James)	×		
striata Ulrich			×

Lists of species—Continued.

CINCINNATI—Continued.

	Utica.	Lorraine.	Richmond.
Bythotrypa epidermata (Ulrich)			×
Callopora andrewsi (Nicholson)		×	
dalei (Edwards and Haime)		×	
nodulosa (Nicholson)	×		
onealli (James)	×		
onealli-communis (James)	×		
onealli-sigillarioides (Nicholson)	×		
ramosa (D'Orbigny)		×	
rugosa (Edwards and Haime)		×	
subnodosa Ulrich			×
subplana Ulrich		×	
Calloporella circularis (James)			×
? lens (Whitfield)			×
? nodulosa Ulrich			×
Ceramoporella distincta Ulrich	×	×	
granulosa Ulrich			×
granulosa-milfordensis (James)	×		
irregularis (Whitfield)			×
ohioensis (Nicholson)	×	×	×
stellata Ulrich			×
whitei (James)		×	×
Chiloporella nicholsoni (James)		×	
Cœloclema alternatum (James)	×		
concentricum (James)	×		
oweni (James)		×	
Constellaria constellata (Van Cleve) Dana		×	
constellata-plana Ulrich		×	
constellata-prominens Ulrich	×	×	
limitaris (Ulrich)			×
parva Ulrich			×
polystomella Nicholson			×
punctata (Whitfield)			×
Crepipora hemispherica Ulrich			×
impressa Ulrich		×	
simulans Ulrich		×	×
solida Ulrich	×		
venusta (Ulrich)	×		
Dekayella obscura Ulrich	×		
ulrichi (Nicholson)	×		
ulrichi-robusta Foord	×		

Lists of species—Continued.

CINCINNATI—Continued.

	Utica.	Lorraine.	Richmond.
Dekayia appressa Ulrich	....	×	....
aspera Edwards and Haime	....	×	....
maculata James	×	....	....
multispinosa Ulrich	....	×	....
pelliculata Ulrich	....	×	....
Dicranopora emacerata (Nicholson)	....	×	×
fragilis (Billings)	....	....	×
internodia (Miller and Dyer)	....	×	....
nitidula (Billings)	....	....	×
Diplotrypa ? dubia Ulrich	....	....	×
Discotrypa elegans (Ulrich)	....	×	....
Eridotrypa simulatrix (Ulrich)	....	....	×
Escharopora acuminata (James)	×	....	....
falciformis (Nicholson)	....	×	....
hilli (James)	....	×	....
maculata (Ulrich)	....	×	....
pavonia (D'Orbigny)	....	×	....
Eurydictya montifera Ulrich	....	....	×
sterlingensis Ulrich	....	....	×
Fenestella granulosa Whitfield	....	....	×
Goniotrypa bilateralis Ulrich	....	....	×
Graptodictya perelegans (Ulrich)	....	....	×
Helopora elegans Ulrich	....	....	×
harrisi James	....	....	×
imbricata Ulrich	....	....	×
Hemiphragma imperfectum (Ulrich)	....	....	×
whitfieldi (James)	×	....	....
Heterotrypa affinis (Ulrich)	....	....	×
frondosa (D'Orbigny)	....	×	....
inflecta Ulrich	....	×	....
paupera (Ulrich)	....	×	....
singularis Ulrich	....	....	×
solitaria Ulrich	....	×	....
subpulchella (Nicholson)	....	×	....
subramosa (Ulrich)	....	....	×
subramosa-prolifica Ulrich	....	....	×
Homotrypa curvata Ulrich	....	×	....
dawsoni (Nicholson)	....	×	×
flabellaris Ulrich	....	×	×
gelasinosa Ulrich	....	....	×
obliqua Ulrich	....	×	....

Lists of species—Continued.

CINCINNATI—Continued.

	Utica.	Lorraine.	Richmond.
notrypella contexta Ulrich			×
rustica Ulrich			×
totrypa calceola (Miller and Dyer)		×	
clavacoidea (James)		×	
? clavis Ulrich	×		
? cortex Ulrich	×		
? dychei (James)		×	
? irregularis (Ulrich)		×	
minima Ulrich		×	
ornata Ulrich		×	
? semipilaris Ulrich		×	
stidhami Ulrich			×
clema ? wilmingtonense Ulrich			×
clemella annulifera (Whitfield)			×
fusiformis (Whitfield)			×
nitida (Ulrich)			×
solidissima (Whitfield)			×
subfusiformis (James)			×
sotrypa patella (Ulrich)			×
notrypa nodosa Ulrich			×
turbinata (James)	×		
undulata-hemispherica (J. F. James)			×
notrypella æqualis Ulrich	×		
crassimuralis Ulrich			×
quadrata (Rominger)			×
subquadrata Ulrich			×
nticulipora cincinnatiensis (James)		×	
?? cleavelandi James			×
lævis Ulrich			×
lævis-consimilis Ulrich			×
lamellosa Ulrich			×
mammulata D'Orbigny		×	
molesta Nicholson		×	
parasitica Ulrich			×
parasitica-plana Ulrich			×
?? winchelli James			×
?? wortheni James			×
holsonella cumulata Ulrich			×
vaupeli (Ulrich)		×	

Lists of species—Continued.

CINCINNATI—Continued.

	Utica.	Lorraine.	Richmond.
Pachydictya fenestelliformis (Nicholson)			×
fenestelliformis-corticula Ulrich			×
? firma Ulrich			×
gigantea Ulrich			×
hexagonalis Ulrich			×
? splendens Ulrich			×
Paleschara beani (James)	×		×
Peronopora compressa (Ulrich)		×	
decipiens (Rominger)		×	×
Petigopora asperula Ulrich		×	
gregaria Ulrich		×	
petechialis (Nicholson)		×	
scabiosa Ulrich		×	
Phænopora wilmingtonensis Ulrich			×
Phylloporina clathrata (Miller and Dyer)		×	
variolata (Ulrich)	×		
Prasopora ? hospitalis (Nicholson)			×
Proboscina auloporoides (Nicholson)		×	×
confusa (Nicholson)	×		
frondosa (Nicholson)		×	×
Protocrisina exigua Ulrich			×
Ptilodictya canadensis Billings			×
flagellum Nicholson			×
magnifica Miller			×
nodosa James			×
plumaria James			×
whiteavesi Ulrich			×
Ptilotrypa obliquata Ulrich			×
Rhinidictya lata (Ulrich)			×
parallela James	×		
Rhopalonaria venosa Ulrich		×	×
Sceptropora facula Ulrich			×
Spatiopora aspera Ulrich		×	
corticans (Nicholson)		×	×
iowensis Ulrich	×		
lineata Ulrich		×	
maculosa Ulrich		×	
montifera Ulrich			×
tuberculata (Edwards and Haime)		×	×

Lists of species—Continued.

CINCINNATI—Continued.

	Utica.	Lorraine.	Richmond.
Stictoporella flexuosa (James)	×		
Stomatopora arachnoidea (Hall)	×	×	×
delicatula (James)	×	×	×
delicatula-tenuissima Ulrich	×		
inflata (Hall)		×	×
turgida Ulrich			×
Trematopora ?? granulata Whitfield			×
Vinella radialis Ulrich		×	

SILURIAN.

	Anticosti.	Clinton.	Niagara.	Lower Held.
Aspidopora parmula (Foerste)		×		
parmula-fenestelliformis Foerste		×		
Batostomella ? aspera (Hall)			×	
granulifera (Hall)			×	
Berenicea elegans (Hall)			×	
membranacea (Hall)			×	
Bythopora spinulosa (Hall)			×	
Callopora ?? cervicornis Hall			×	
?? diversa Hall			×	
elegantula Hall			×	
magnopora Foerste		×		
?? nummiformis Hall			×	
?? oppleta Hall and Simpson				×
perelegans Hall				×
Callotrypa heteropora (Hall)				×
macropora (Hall)				×
macropora-signata (Hall)				×
oculifera (Hall)				×
paucipora Hall and Simpson				×
striata (Hall and Simpson)				×
unispina (Hall)				×
Ceramopora ? confluens Hall			×	
? expansa James		×		
? explanata Hall			×	
imbricata Hall			×	
? labeculoidea Hall				×

Lists of species—Continued.

SILURIAN—Continued.

	Anticosti.	Clinton.	Niagara.	Lower Held.
Ceramopora ? maculata Hall	......	......	......	×
? notha Hall	......	......	×	......
orbiculata Ringueberg	......	......	×	......
? parvicella Hall	......	......	......	×
? raripora Hall	......	......	×	......
Chætetes ?? expansus Ringueberg	......	......	×	......
Chilotrypa ? coalescens (Hall)	......	......	×	......
dispersa (Hall)	......	......	......	×
ostiolata (Hall)	......	......	×	......
varia (Hall)	......	......	×	......
variolata (Hall)	......	......	×	......
Clathropora ? alcicornis Hall	......	......	×	......
frondosa Hall	......	×	×	......
frondosa-clintonensis Hall and Whitfield	......	×	......	......
intermedia Nicholson and Hinde	......	......	×	......
Cœlocaulis ? mediopora (Hall)	......	......	......	×
venusta (Hall)	......	......	......	×
Diamesopora dichotoma Hall	......	......	×	......
infrequens (Hall)	......	......	×	......
osculum (Hall)	......	......	×	......
subimbricata (Hall)	......	......	×	......
? tubulosa (Hall)	......	×	......	......
Dicranopora fragilis (Billings)	×	......	......	......
granulosa (Hall and Simpson)	......	......	......	×
Diploclema sparsum (Hall)	......	......	×	......
Drymotrypa cisseis (Hall)	......	......	......	×
diffusa (Hall)	......	......	×	......
niagarensis (Hall)	......	......	×	......
Eridotrypa corticosa (Hall)	......	......	......	×
echinata (Hall)	......	......	×	......
Fenestella acuticosta Roemer	......	......	×	......
adornata Hall and Simpson	......	......	......	×
adraste Hall	......	......	......	×
æsyle Hall	......	......	......	×
althæa Hall	......	......	......	×
bellistriata Hall	......	......	×	......
cleia Hall	......	......	......	×
crebripora Hall	......	......	......	×
? cribrosa Hall	......	......	×	......

Lists of species—Continued.

SILURIAN—Continued.

	Anticosti.	Clinton.	Niagara.	Lower Held.
Fenestella elegans Hall			×	
? frequens Hall				×
hestia Hall				×
? idalia Hall				×
juncea Hall				×
noe Hall and Simpson				×
parvulipora Hall			×	
pertenuis Hall			×	
philia Hall				×
prolixa Hall			×	
spio Hall and Simpson				×
sylvia Hall				×
tenuis Hall		×		
Fistulipora ? crassa (Hall)				×
distans (Hall)				×
halli Rominger			×	
hemispherica (Roemer)			×	
maculosa (Hall)				×
neglecta Rominger			×	
neglecta-maculata Hall			×	
serialis (Hall and Simpson)				×
torta (Hall)				×
? triloba Hall and Simpson				×
Helicopora latispiralis Claypole			×	
Helopora armata Billings	×			
bellula Billings	×			
? ? circe Billings	×			
? ? concava Billings	×			
fragilis Hall		×	×	
? ? irregularis Billings	×			
nodosa Billings	×			
? ? varipora Billings	×			
Hemitrypa biserialis (Hall)				×
biserialis-exilis (Hall and Simpson)				×
ulrichi Foerste		×		
Homotrypa ? confluens Foerste		×		
? solida (Hall)			×	
Ichthyorachis nereis Hall				×
Idiotrypa parasitica Ulrich			×	
Leptotrypa ? sphærion (Hall)			×	

Lists of species—Continued.

SILURIAN—Continued.

	Anticosti.	Clinton.	Niagara.	Lower Held.
Lichenalia concentrica Hall			×	
Lioclema asperum (Hall)			×	
cellulosum (Hall)				×
? exsul (Hall)			×	
(? Nicholsonella) floridum (Hall)			×	
(? Nicholsonella) laminatum (Hall)			×	
parasiticum (Hall)				×
ponderosum (Hall)				×
Lioclemella ohioensis (Foerste)		×		
Loculipora ambigua (Hall)			×	
loculata (Hall)				×
Meekopora foliacea (Hall)			×	
Mesotrypa milleri (Ulrich)			×	
Monotrypa colliculata (Hall)				×
? helderbergiæ (Hall)				×
monticulata (Hall)				×
? proxima (Hall)				×
sphærica (Hall)				×
?? spinulosa (Hall and Simpson)				×
tabulata (Hall)				×
Monotrypella ? abrupta (Hall)				×
? arbuscula (Hall)				×
? consimilis (Hall)			×	
? densa (Hall)				×
Nematopora formosa (Billings)	×			
lineata (Billings)	×			
? lineopora (Billings)	×			
macropora (Hall)			×	
minuta (Hall)			×	
raripora (Hall)		×	×	
striatopora (Billings)	×			
strigosa (Billings)	×			
Orthopora canaliculata (Hall)				×
granilinea (Hall and Simpson)				×
nodosa (Hall and Simpson)				×
ovatipora (Hall)				×
parallela (Hall)				×
regularis (Hall)				×
rhombifera (Hall)				×

Lists of species—Continued.

SILURIAN—Continued.

	Anticosti.	Clinton.	Niagara.	Lower Held.
Pachydictya alcyone (Billings)	×			
bifurcata (Hall)		×		
bifurcata-instabilis Foerste		×		
crassa (Hall)	×	×	×	
emaciata Foerste		×		
? famelica Foerste		×		
obesa Foerste		×		
turgida Foerste		×		
Paleschara ?? bilateralis Hall				×
concentrica Hall and Simpson				×
? dissimilis (Hall)				×
? incrassata Hall			×	
incrustans Hall				×
? maculata Hall			×	
? offula Hall			×	
radiata Hall				×
? tenuis Hall and Simpson				×
Phænopora constellata Hall		×		
ensiformis Hall		×		
excellens (Billings)	×			
expansa Hall and Whitfield		×		
explanata Hall		×		
fimbriata (James)		×		
lirata (Hall)				×
magna (Hall and Whitfield)		×		
multifida (Hall)		×		
punctata (Nicholson and Hinde)		×		
superba (Billings)	×			
tenuis (Hall)				×
Phylloporina angulata (Hall)		×		
asperato-striata (Hall)			×	
Polypora albionensis Spencer			×	
arta (Hall)				×
compacta (Hall)				×
compressa (Hall)				×
conferta Hall			×	
eudora (Hall)				×
idothea (Hall)				×
incepta Hall			×	

Lists of species—Continued.

SILURIAN—Continued.

	Anticosti.	Clinton.	Niagara.	Lower Held.
Polypora lilæa Hall				×
obliqua (Hall)				×
paxillata (Hall)				×
punctostriata (Hall)			×	
? stricta (Hall and Simpson)				×
tantula (Hall)			×	
varia (Hall)				×
Ptilodictya angusta (Hall)			×	
expansa Hall		×		
expansa-emarcescens Foerste		×		
gladiola Billings	×			
nebulosa (Hall)				×
obliqua Ringueberg		×		
sulcata Billings	×			
? tenera (Billings)	×			
whitfieldi Foerste		×		
Ptiloporella nervata (Nicholson)			×	
Rhinopora ? tuberculosa Hall			×	
? tubulosa Hall		×		
verrucosa Hall		×		
Sceptropora fustiformis Ulrich		×		
Semicoscinium acmeum (Hall)			×	
? cleis (Hall)				×
coronis (Hall)				×
tenuiceps (Hall)			×	
thyene (Hall)				×
Stictopora ?? granatula Hall				×
?? obsoleta Hall and Simpson				×
?? papillosa Hall				×
Stictotrypa orbipora (Hall)			×	
punctipora (Hall)			×	
similis (Hall)			×	
Stomatopora parva Ringueberg			×	
recta Ringueberg			×	
Thamniscus dichotomus (Hall)			×	
fruticellus Hall				×
nysa Hall				×
variolatus Hall				×
Trematopora halli Ulrich			×	
?? punctata Hall			×	

Lists of species—Continued.

SILURIAN—Continued.

	Anticosti.	Clinton.	Niagara.	Lower Held.
Trematopora ? singularis Hall			×	
? spiculata Miller			×	
?? superba Billings		×	×	
tuberculosa Hall			×	
whitfieldi Ulrich			×	
Trigonodictya eatonensis Ulrich		×		
Unitrypa nervia (Hall)				×
nervia-constricta (Hall)				×
præcursor (Hall)				×
quadrula (Hall)				×
Vinella radiciformis-conferta Ulrich			×	

DEVONIAN.

	Oriskany.	Upper Held.	Hamilton.
Acanthoclema alternatum (Hall)		×	
divergens Hall and Simpson		×	
ovatum Hall and Simpson		×	
sulcatum Hall and Simpson			×
triseriale (Hall)		×	
Acrogenia prolifera Hall			×
Ascodictyon fusiforme Nicholson and Etheridge, Jun			×
stellatum Nicholson and Etheridge, Jun			×
Bactropora curvata Hall and Simpson			×
granistriata (Hall)			×
Botryllopora socialis Nicholson			×
Buskopora bistriata (Hall)			×
dentata Ulrich			×
lunata (Rominger)		×	
pyriformis (Hall)			×
Callotrypa ? geniculata (Hall)		×	
internodata (Hall)			×
multiseriata (Hall)		×	
Ceramella scidacea Hall and Simpson			×
Ceramopora ?? imbricella Hall			×
Chætetes ?? hamiltonensis Winchell			×
?? microscopicus Winchell			×

Lists of species—Continued.

DEVONIAN—Continued.

	Oriskany.	Upper Held.	Hamilton.
Chætetes ?? ponderosus Rominger			×
?? tenuis Hall		×	×
Chilotrypa camerata (Hall)		×	
Clathropora intertexta Nicholson		×	
Clonopora incurva Hall		×	
fasciculata Hall and Simpson		×	
semireducta Hall			×
Cœlocaulis ?? aculeolata Hall		×	
?? hyale Hall		×	
? irregularis (Hall)		×	
Coscinella cosciniformis (Nicholson)			×
elegantula Hall and Simpson			×
Coscinium cribriforme Prout			×
striatum Hall and Simpson			×
striaturum (Hall)		×	
Crisinella scrobiculata (Hall)		×	
Cyclotrypa collina (Ulrich)			×
communis (Ulrich)			×
Cystodictya angularis (Hall and Simpson)			×
bifurcata (Hall and Simpson)			×
crescens (Hall)		×	
gilberti (Meek)		×	×
hamiltonensis Ulrich			×
incisurata (Hall)			×
? invertis (Hall)		×	
limata (Hall and Simpson)			×
linearis (Hall)		×	
meeki (Nicholson)		×	×
ovata (Hall and Simpson)			×
ovatipora (Hall)			×
perarcta (Hall)		×	
recta (Hall and Simpson)			×
rectilinea (Hall and Simpson)			×
rigida (Hall)		×	
semistriata (Hall)		×	
sinuosa (Hall)			×
subrigida (Hall)			×
sulcata (Winchell)			×
trilineata (Hall and Simpson)			×

Lists of species—Continued.

DEVONIAN—Continued.

	Oriskany.	Upper Held.	Hamilton.
Cystodictya tumulosa (Hall)			×
vermicula (Hall)			×
Cystopora geniculata Hall			×
Dekayia ? devonica Ulrich			×
Dichotrypa foliata Ulrich			×
Discotrypa ? devonica Ulrich			×
Eridopora ? clivulata (Hall)			×
denticulata (Hall)			×
Eridotrypa appressa (Ulrich)			×
? obliqua (Ulrich)			×
Euspilopora ? barrisi Ulrich			×
lobata (Hall and Simpson)			×
palmipes (Hall)			×
serrata Ulrich			×
Favicella inclusa (Hall)			×
tessellata (Hall and Simpson)			×
Fenestella æqualis Hall			×
angustata Hall			×
arkonensis Whiteaves			×
assita Hall			×
biseriata Hall		×	
clathrata Hall and Simpson		×	
cultrata Hall			×
curvata Hall			×
curvijunctura Hall			×
depressa Hall			×
dilata Prout			×
dispanda Hall		×	
emaciata Hall			×
? erectipora Hall		×	
eximia Winchell			×
filitexta Winchell			×
magnifica Nicholson		×	
marcida Hall			×
marginalis Nicholson		×	
? nexilis Hall		×	
nicholsoni Whiteaves			×
nodosa Prout			×
parallela Hall		×	

Lists of species—Continued.

DEVONIAN—Continued.

	Oriskany.	Upper Held.	Hamilton.
Fenestella peculiaris Hall		×	
perplexa Hall			×
planiramosa Hall			×
proceritas Hall and Simpson		×	
proutana Miller			×
pulchella Ulrich			×
quadrangula Hall			×
serrata Hall			×
singularitas Hall			×
sinuosa Hall		×	
spissa Hall			×
stellata Hall			×
tenella Hall			×
tuberculata Hall and Simpson		×	
variapora Hall			×
vera Ulrich			×
verrucosa Hall			×
Fenestrapora biperforata Hall			×
infraporosa (Ulrich)			×
occidentalis Ulrich			×
Fistulipora acervulosa Rominger			×
alternata (Hall)			×
astrica Ulrich			×
? bullata (Hall and Simpson)			×
colliculata (Hall)			×
? confusa (Hall and Simpson)			×
? constricta (Hall)			×
conulata (Hall)			×
cornuta (Hall and Simpson)			×
(?Dichotrypa) corrugata Ulrich			×
cultellata (Hall)			×
distensa (Hall)			×
eriensis Rominger			×
foliacea (Hall)			×
foordi Ulrich			×
geometrica (Hall)			×
granifera (Hall)			×
?? helios Rominger		×	
? hemispherica (Hall)			×

Lists of species—Continued.

DEVONIAN—Continued.

	Oriskany.	Upper Held.	Hamilton.
Fistulipora huronensis (Nicholson)			×
incrassata (Nicholson)			×
interaspera Hall and Simpson			×
labiosa Winchell			×
? lamellata (Hall)		×	
longimacula (Hall)			×
monticulata Ulrich			×
normalis Ulrich			×
ovata (Hall)			×
? permarginata (Hall)		×	
? pustulosa (Hall and Simpson)			×
ramosa (Hall and Simpson)			×
romingeri Nicholson and Foord			×
saffordi Winchell			×
? scrobiculata (Hall)			×
spinulifera Rominger			×
subcava (Hall)			×
substellata (Hall)			×
subtrigona (Hall and Simpson)			×
sulcata Rominger			×
? triangularis (Hall)			×
? trifaria Hall and Simpson			×
? umbilicata (Hall)			×
? unilinea Hall and Simpson			×
utriculus Rominger			×
vesiculata Hall and Simpson			×
Glossotrypa paliformis (Hall)			×
Hederella alternata (Hall and Whitfield)			×
canadensis (Nicholson)		×	×
cirrhosa Hall			×
conferta (Hall)			×
filiformis (Billings)			×
magna Hall			×
Helicopora ulrichi Claypole			×
Hemitrypa biordo Hall		×	
columellata (Hall and Simpson)		×	
cribrosa (Hall)			×
favosa (Hall)		×	
tenera Ulrich			×

Lists of species—Continued.

DEVONIAN—Continued.

	Oriskany.	Upper Held.	Hamilton.
Hernodia humifusa Hall			×
Heterotrypa ? barrandei (Nicholson)			×
? moniliformis (Nicholson)			×
Intrapora puteolata Hall			×
Isotrypa conjunctiva (Hall)		×	
consimilis Hall		×	
Leptotrypa ? quadrangularis (Nicholson)			×
Lichenotrypa longispina (Hall)			×
Lioclema confertiporum (Hall)			×
decipiens (Hall)			×
densum (Hall)			×
digitatum (Hall)			×
intercellatum (Hall)			×
involvens (Hall and Simpson)			×
microporum (Hall)			×
minutissimum (Nicholson)			×
minutum (Rominger)			×
multaculeatum (Hall)			×
occidens (Hall and Whitfield)			×
punctillatum (Winchell)			×
segregatum (Hall)			×
spheroideum (Hall)			×
subtile (Hall)			×
Loculipora circumstata (Hall and Simpson)		×	
perforata (Hall)			×
Meekopora stellifera (Rominger)			×
Monotrypa ? amplectens Grabau			×
Monotrypella ? unjiga Whiteaves			×
Monticulipora ? monticula (White)			×
? winchelli Ulrich			×
Nemataxis fibrosus Hall		×	
? simplex Hall and Simpson			×
Orthopora bispinulata (Hall)			×
carinata Hall and Simpson			×
elongata (Hall and Simpson)			×
granifera (Hall and Simpson)			×
hexagona (Hall and Simpson)			×
immersa (Hall and Simpson)			×
interplana (Hall and Simpson)			×

Lists of species—Continued.

DEVONIAN—Continued.

	Oriskany.	Upper Held.	Hamilton.
Orthopora lineata (Hall and Simpson)			×
orbipora (Hall)			×
ornata (Hall and Simpson)			×
polygona (Hall)			×
regularis (Hall)			×
reticulata (Hall and Simpson)			×
rhombifera (Hall)			×
scutulata (Hall)		×	
subquadrata (Hall)			×
tortalinea (Hall)			×
transversa (Hall)			×
Paleschara ? intercella Hall			×
? pertenuis Hall			×
? reticulata Hall			×
? variacella Hall			×
Petalotrypa compressa Ulrich			×
delicata Ulrich			×
Phractopora cristata (Hall)			×
Phyllopora aspera Ulrich			×
Pinacotrypa elegans (Rominger)			×
marginata Whiteaves			×
operculata (Hall and Simpson)			×
plana (Hall)			×
serrulata (Hall)			×
stellata (Hall)			×
variapora (Hall)			×
Pinnatopora carinata (Hall)			×
nodata (Hall)		×	
sinuosa (Hall)		×	
tenuistriata (Hall)		×	
Polypora aculeata (Hall)			×
arkonensis Miller			×
aspectans (Hall)			×
blandida Ulrich			×
brevisulcata (Hall)		×	
carinella (Hall and Simpson)		×	
celsipora (Hall)		×	
celsipora-minima Hall			×
celsipora-minor Hall		×	

Lists of species—Continued.

DEVONIAN—Continued.

	Oriskany.	Upper Held.	Hamilton.
Polypora crebrescens (Hall)	....	×	....
cylindracea (Hall)	....	×	....
distans (Hall)	....	×	....
elongata (Hall)	....	×	....
fistulata (Hall)	....	....	×
flabelliformis (Hall)	....	×	....
granilinea (Hall)	....	×	....
hexagonalis (Hall)	....	×	....
hexagonalis-foraminulosa (Hall)	....	×	....
intermedia Prout	....	....	×
lævistriata (Hall)	....	....	×
largissima (Hall)	....	×	....
latitruncata (Hall)	....	....	×
levinodata (Hall)	....	....	×
manitobensis Whiteaves	....	....	×
multiplex (Hall)	....	....	×
mutabilis (Hall)	....	×	....
nexa (Hall)	....	×	....
perangulata (Hall)	....	×	....
porosa (Hall)	....	×	....
propria (Hall)	....	×	....
? psyche Billings	×	....	....
pulchella Nicholson	....	×	....
quadrangularis (Hall)	....	....	×
rigida (Hall)	....	×	....
robusta (Hall)	....	×	....
rustica (Hall and Simpson)	....	×	....
separata (Hall and Simpson)	....	×	....
shumardi Prout	....	....	×
striatopora (Hall)	....	....	×
submutans (Hall)	....	....	×
tenella Nicholson	....	×	....
transversa Ulrich	....	....	×
Prismopora dilatata Hall	....	....	×
lata Hall and Simpson	....	....	×
paucirama Hall	....	×	....
sparsipora (Hall)	....	....	×
triquetra Hall	....	....	×
Proboscina ? laxa Whiteaves	....	....	×

Lists of species—Continued.

DEVONIAN—Continued.

	Oriskany.	Upper Held.	Hamilton.
Ptilocella parallela (Hall and Simpson)			×
Ptilodictya gigantea (Nicholson)		×	
?? tarda Billings	×		
Ptilopora infrequens (Hall and Simpson)			×
nodosa (Hall)			×
striata Hall			×
Ptiloporella bifurca (Ulrich)			×
inæqualis (Hall and Simpson)		×	
laticrescens (Hall and Simpson)		×	
Ptiloporina conica (Hall and Simpson)		×	
disparilis (Hall and Simpson)		×	
pinnata (Hall and Simpson)		×	
sinistralis (Hall and Simpson)		×	
Reptaria nodata (Hall)			×
stolonifera Rolle			×
Reteporidra adnata (Hall)			×
cinctuta (Hall)			×
perundata (Hall)			×
Reteporina coalescens (Hall and Simpson)		×	
hamiltonensis (Prout)			×
perundulata (Hall)			×
phillipsi (Nicholson)		×	
prisca (Goldfuss?) (Nicholson)		×	×
rhombifera (Hall)		×	
striata (Hall)			×
Rhombopora lineinodis Ulrich			×
lineinodis-humilis Ulrich			×
subannulata Ulrich			×
sulcifera Ulrich			×
Scalaripora approximata Ulrich			×
canadensis Whiteaves			×
scalariformis Hall			×
separata Ulrich			×
subconcava Hall			×
Selenopora circincta (Hall)			×
complexa (Hall)			×
Semicoscinium biimbricatum (Hall)			×
biserrulatum Hall			×
davidsoni (Nicholson)			×

Lists of species—Continued.

DEVONIAN—Continued.

	Oriskany.	Upper Held.	Hamilton
Semicoscinium eriense Prout			
exornatum (Hall)			×
graniferum (Hall)		×	
hindei (Nicholson)		×	
inflexum (Hall)			×
interruptum (Hall)			×
labiatum (Hall)			×
latijuncturum (Hall)			×
lunulatum (Hall)			×
mirabile (Nicholson)		×	
permarginatum (Hall)			×
planidorsatum Ulrich			×
*rhombicum Ulrich			×
rhomboideum Prout			×
semirotundum (Hall)			×
subtortile (Hall)			×
tortum (Hall)			×
tuberculatum (Prout)			×
Semiopora bistigmata Hall			×
Stictopora ?? divergens Hall and Simpson			×
?? fruticosa Hall		×	
?? granifera Hall			×
?? incrassata Hall			×
?? interstriata Hall			×
?? permarginata Hall			×
?? striata Hall and Simpson			×
Stictoporina claviformis (Hall)			×
plumea (Hall and Simpson)			×
scutulata (Hall)			×
Stomatopora ?? moniliformis Whiteaves			×
Streblotrypa hamiltonensis (Nicholson)			×
scutulata (Hall)			×
Strotopora perminuta Ulrich			×
Tæniodictya ? rhomboidea (Hall)		×	
Tæniopora exigua Nicholson			×
occidentalis Ulrich			×
penniformis Nicholson			×
recubans (Hall and Simpson)			×
subcarinata (Hall)			×

Lists of species—Continued.

DEVONIAN—Continued.

	Oriskany.	Upper Held.	Hamilton.
Thamniscus multiramus Hall		×	
nanus Hall			×
pauciramus Hall			×
Thamnotrypa divaricata (Hall)		×	
Trematella annulata (Hall)			×
arborea (Hall)			×
glomerata (Hall)		×	
nodosa (Hall and Simpson)			×
perspinulata (Hall)			×
Tropidopora nana Hall		×	
Unitrypa acaulis (Hall)			×
acclivis (Hall and Simpson)		×	
anonyma (Hall)			×
? elegantissima (Hall)		×	
fastigata (Hall)			×
ficticia (Hall and Simpson)		×	
lata (Hall)		×	
nana (Hall and Simpson)		×	
pernodosa (Hall)		×	
scalaris (Hall)			×
substriata (Hall)		×	
tegulata (Hall)			×

MISSISSIPPIAN.

	Ki.	Osage.			St. Louis.			Ch.
		Wav.	Bur.	Keo.	War.	St. L.	Ste. G.	
Acanthoclema confluens (Ulrich)		×		×				
Actinotrypa peculiaris (Rominger)				×				
Anisotrypa fistulosa Ulrich							×	
ramulosa Ulrich							×	
solida Ulrich								×
symmetrica Ulrich								×
Archimedes communis Ulrich								×
compactus Ulrich								×
distans Ulrich								×
grandis Ulrich				×				
intermedius Ulrich								×

Lists of species—Continued.

MISSISSIPPIAN—Continued.

	Kl.	Osage.			St. Louis.			Ch.
		Wav.	Bur.	Keo.	War.	St. L.	Ste. G.	
Archimedes invaginatus Ulrich								×
laxus (Hall)								×
meekanus (Hall)								×
negligens Ulrich				×				
owenanus (Hall)				×				
perminimus Ulrich								×
proutanus Ulrich								×
sublaxus Ulrich								×
swallovanus (Hall)								×
terebriformis Ulrich								×
wortheni (Hall)					×			
Bactropora simplex Ulrich				×				
Batostomella abrupta Ulrich								×
interstincta Ulrich							×	
nitidula Ulrich								×
spinulosa Ulrich								×
Berenicea ? insueta Dawson								
Chilotrypa hispida Ulrich								×
Cœloconus granosus Ulrich								×
rhombicus Ulrich					×			
Coscinium latum Ulrich			×					
Cyclopora expatiata Ulrich				×				
fungia Prout		×		×				
Cycloporella ? perversa Ulrich				×				
spinifera Ulrich				×				
Cystodictya americana Ulrich				×				
angusta Ulrich		×						
lineata Ulrich				×				
lineata-major Ulrich						×		
lineata-sancti-ludovici Ulrich						×		
nitida Ulrich				×				
ocellata Ulrich				×				
pustulosa Ulrich				×				
simulans Ulrich		×		×				
zigzag Ulrich		×		×				
Dichotrypa elegans Ulrich						×		
expatiata Ulrich						×		
flabellum (Rominger)						×		

Lists of species—Continued.

MISSISSIPPIAN—Continued.

	Ki.	Osage.			St. Louis.			Ch.
		Wav.	Bur.	Keo.	War.	St. L.	Ste. G.	
Dichotrypa intermedia Ulrich						×		
lyroides Ulrich						×		
Diploporaria bifurcata Ulrich								×
Eridopora macrostoma Ulrich								×
punctifera Ulrich								×
Evactinopora grandis Meek and Worthen			×					
quinqueradiata Ulrich			×					
radiata Meek and Worthen				×				
sexradiata Meek and Worthen			×					
Fenestella albida Hall		×						
aperta Hall		×						
banyana Prout					×			
burlingtonensis Ulrich		×	×					
cavernosa Ulrich		×						
cestriensis Ulrich								×
cingulata Ulrich				×				
compressa Ulrich				×				
delicata Meek		×						
elevatipora Ulrich								×
exigua Ulrich					×			
filistriata Ulrich			×					
foliata Ulrich		×						
funicula Ulrich				×				
herrickana Ulrich		×						
limitaris Ulrich				×				
lodiensis Meek		×						
meekana Ulrich		×						
multispinosa Ulrich				×				
nododorsalis Ulrich				×				
regalis Ulrich				×				
regalis-macra Ulrich				×				
richfieldensis Ulrich		×						
rudis Ulrich				×	×			
serratula Ulrich				×	×	×		×
subflexuosa Ulrich		×						
tenax Ulrich		×			×			×

Lists of species—Continued.

MISSISSIPPIAN—Continued.

	Ki.	Osage.			St. Louis.			Ch.
		Wav.	Bur.	Keo.	War.	St. L.	Ste. G.	
Fenestella triserialis Ulrich	....	......	......	×	......	......	......	....
Fenestralia compacta Ulrich	....	......	......	......	......	×	......	....
sancti-ludovici Prout	....	......	......	......	×	×	......	....
Fistulipora asteria (Prout)	....	......	......	×	......	......	......	....
compressa Rominger	....	......	......	×	......	......	......	....
excellens Ulrich	....	......	......	......	......	......	......	×
prolifica Ulrich	....	......	......	......	......	×	......	....
spergenensis Rominger	....	......	......	......	×	......	......	....
? tuberculata Prout	....	......	......	×	......	......	......	....
Glyptopora elegans (Prout)	....	......	......	......	×	......	......	....
keyserlingi (Prout)	....	......	......	×	......	......	......	....
michelinia (Prout)	....	......	......	......	×	......	......	....
plumosa (Prout)	....	......	......	......	×	......	......	....
punctipora Ulrich	....	......	......	......	......	......	......	×
sagenella (Prout)	....	......	......	×	×	......	......	....
sagenella-caliculosa Ulrich	....	......	......	......	×	......	......	....
sagenella-lata Ulrich	....	......	......	......	×	......	......	....
Heliotrypa bifolia Ulrich	....	......	......	......	......	......	......	×
Hemitrypa aspera Ulrich	....	......	......	×	......	......	......	....
nodosa Ulrich	....	......	......	×	......	......	......	....
pateriformis Ulrich	....	......	......	×	......	......	......	....
perstriata Ulrich	....	......	......	×	......	......	......	....
plumosa (Prout)	....	......	......	......	×	......	......	....
proutana Ulrich	....	......	......	×	×	×	......	....
proutana-nodulosa Ulrich	....	......	......	×	......	......	......	....
proutana-vermifera Ulrich	....	......	......	......	×	......	......	....
Intrapora basalis (Ulrich)	....	......	......	......	×	......	......	....
undulata (Ulrich)	....	......	......	......	......	......	......	×
Lioclema ? araneum Ulrich	....	......	......	......	......	......	......	×
foliatum Ulrich	....	......	......	......	×	......	......	....
gracillimum Ulrich	×	×	×	×	×	......	......	....
punctatum (Hall)	....	×	......	×	×	×	......	....
subglobosum Ulrich	×	......	......	......	......	......	......	....
wachsmuthi Ulrich	×	......	......	......	......	......	......	....
Lyropora divergens Ulrich	....	......	......	......	......	......	......	×
ovalis Ulrich	....	......	......	......	......	......	......	×
quincuncialis (Hall)	....	......	......	......	......	......	......	×

Lists of species—Continued.

MISSISSIPPIAN—Continued.

	Kl.	Osage.			St. Louis.			Ch.
		Wav.	Bur.	Keo.	War.	St. L.	Ste. G.	
·opora ranosculum Ulrich								×
retrorsa (Meek and Worthen)			×					
subquadrans (Hall)								×
subquadrans-lyra (Hall)								×
ekopora ? aperta Ulrich				×				
approximata Ulrich								×
clausa (Ulrich)								×
eximia Ulrich						×		×
ractopora megastoma (Ulrich)		×		×				
pinnata (Ulrich)			×					
trifolia (Rominger)				×				
ınatopora conferta Ulrich				×				
curvata Ulrich		×						
flexuosa Ulrich				×				
intermedia Ulrich		×						
minor Ulrich		×						
simulatrix Ulrich		×						
striata Ulrich				×				
subangulata Ulrich		×						
tenuiramosa Ulrich		×						
vinei Ulrich		×		×				
youngi Ulrich		×		×				
ypora approximata Ulrich								×
biseriata Ulrich					×			
burlingtonensis Ulrich			×					
cestriensis Ulrich								×
complanata Ulrich								×
corticosa Ulrich								×
? gracilis Prout				×				
halliana Prout				×	×			
impressa Ulrich		×						
maccoyana Ulrich				×				
radialis Ulrich		×		×				
retrorsa Ulrich				×				
simulatrix Ulrich				×				
spininodata Ulrich					×			
spinulifera Ulrich								×

Lists of species—Continued.

MISSISSIPPIAN—Continued.

	Kl.	Osage.			St. Louis.			Ch.
		Wav.	Bur.	Keo.	War.	St. L.	Ste. G.	
Polypora tuberculata Prout								×
varsoviensis Prout					×			
Prismopora serrulata Ulrich								×
Proutella discoidea (Prout)				×				
Ptilopora acuta Ulrich			×	×				
cylindracea Ulrich				×				
paupera Ulrich		×		×				
prouti Hall					×			
valida Ulrich				×				
Reteporina flexuosa (Ulrich)								×
Rhombopora angustata Ulrich				×				
armata Ulrich								×
? asperula Ulrich				×				
attenuata Ulrich				×				
decipiens Ulrich						×		
dichotoma Ulrich			×	×				
elegantula Ulrich				×				
exigua Ulrich			×					
gracilis Ulrich			×					
incrassata Ulrich		×		×				
minor Ulrich								×
ohioensis Ulrich		×						
persimilis Ulrich								×
pulchella Ulrich								×
simulatrix Ulrich						×		
? spiralis Ulrich				×				
tabulata Ulrich								×
tenuirama Ulrich								×
transversalis Ulrich				×				
varians Ulrich				×				
wortheni Ulrich						×		
Septopora biserialis-nervata Ulrich								×
cestriensis Prout								×
decipiens Ulrich								×
rectistyla (Whitfield)								×
robusta-intermedia Ulrich								×
subquadrans Ulrich								×
Sphragiopora parasitica Ulrich								×

Lists of species—Continued.

MISSISSIPPIAN—Continued.

	Ki.	Osage.			St. Louis.			Ch.
		Wav.	Bur.	Keo.	War.	St. L.	Ste. G.	
Stenopora americana Ulrich				×				
americana-varsoviensis Ulrich					×			
angularis Ulrich				×				
cestriensis Ulrich								×
emaciata Ulrich				×				
intercalaris Ulrich				×				
intermittens Ulrich				×				
meekana Ulrich								×
montifera Ulrich				×				
ramosa Ulrich								×
rudis Ulrich								×
tuberculata (Prout)					×	×		×
Streblotrypa amplexa Ulrich		×						
(? Lioclema) denticulata Ulrich		×						
distincta Ulrich								×
hertzeri Ulrich		×		×				
major Ulrich		×		×				
multiporata Ulrich		×						
nicklesi Ulrich								×
obliqua Ulrich		×						
radialis Ulrich				×				
regularis Ulrich		×						
striata Ulrich		×						
subspinosa Ulrich								×
Strotopora dermata Ulrich				×				
foveolata Ulrich				×				
Tæniodictya cingulata Ulrich				×				
frondosa Ulrich				×				
interpolata Ulrich		×						
ramulosa Ulrich				×				
ramulosa-burlingtonensis Ulrich			×					
subrecta Ulrich						×		
Thamniscus divaricans Ulrich				×				
furcillatus Ulrich								×
ramulosus Ulrich								×
sculptilis Ulrich				×				

Lists of species—Continued.

MISSISSIPPIAN—Continued.

	Ki.	Osage.			St. Louis.			Ch.
		Wav.	Bur.	Keo.	War.	St. L.	Ste. G.	
Trematopora ? ? americana Miller	....	......	×	......	......	......	......	....
? ? fragilis Winchell	....	......	×	......	......	......	......	....
? ? vesiculosa Winchell	....	×	×	......	......	......	......	....
Worthenopora spatulata (Prout)	....	......	......	......	×	......	......	....
spinosa Ulrich	....	......	......	×	......	......	......	....

CARBONIFEROUS.

	Coal Measures.	Permian.
Acanthocladia fruticosa Ulrich	×	....
Chainodictyon laxum Foerste	×	....
laxum-minor Ulrich	×	....
Coscinium dictyotum (Meek)	....	....
Cystodictya carbonaria (Meek)	×	....
? concentrica (Prout)	....	....
Diploporaria biserialis Ulrich	×	....
Fenestella conradi Ulrich	×	....
corticata Prout	....	....
delicatula Ulrich	×	....
inæqualis Ulrich	×	....
intermedia Prout	....	....
limbata Foerste	×	....
lyelli Dawson	....	....
mimica Ulrich	×	....
modesta Ulrich	×	....
norwoodiana Prout	....	....
perelegans Meek	×	....
perminuta Ulrich	×	....
popeana Prout	....	×
remota Foerste	×	....
sevillensis Ulrich	×	....
shumardi Prout	....	....
subretiformis Prout	....	....
trituberculata Prout	....	....
variabilis Prout	....	....
wortheni Ulrich	×	....

Lists of species—Continued.

CARBONIFEROUS—Continued.

	Coal Measures.	Permian.
Fistulipora carbonaria Ulrich	×	
nodulifera Meek	×	
Pinnatopora bellula Ulrich	×	
nereidis (White)		
trilineata (Meek)	×	
whitii Foerste	×	
Polypora crassa Ulrich	×	
distincta Ulrich	×	
mexicana Prout		×
nodocarinata Ulrich	×	
spinulifera Ulrich	×	
stragula White		
submarginata Meek	×	
whitei Ulrich	×	
whitei-insculpta Ulrich	×	
Prismopora minima Ulrich	×	
? serrata Meek	×	
triangulata (White)	×	
Rhombopora crassa Ulrich	×	
exilis (Dawson)		
lepidodendroides Meek	×	
multipora Foerste	×	
nicklesi Ulrich	×	
Septopora biserialis (Swallow)	×	
biserialis-gracilis (Meek)	×	
biserialis-nervata Ulrich	×	
delicatula Ulrich	×	
pinnata Ulrich	×	
robusta Ulrich	×	
Stenopora carbonaria (Worthen)	×	
carbonaria-conferta Ulrich	×	
carbonaria-maculosa Ulrich	×	
ohioensis Foerste	×	
? signata Ulrich	×	
Streblotrypa prisca (Gabb and Horn)		
Thamniscus octonarius Ulrich	×	
sevillensis Ulrich	×	

TABLES OF GENERA AND SPECIES.

These tables show the number of species of the various genera present in the different geologic formations. The tables of the Trenton and Cincinnati periods show also the number of species common to two or more of the divisions and those restricted to one division.

TRENTON.

	Stones R.	Stones R. and Black R.	Black R.	Black R. and Trenton.	Trenton.	Stones R., Black R., Trenton.	Into Cincinnati.	Total.
CTENOSTOMATA.								
Ascodictyonidæ:								
Vinella			1					1
CYCLOSTOMATA.								
Diastoporidæ:								
Stomatopora				1	2	1		4
Proboscina				1				1
Berenicea		1						1
Diastoporina					1			1
Idmoneidæ:								
Protocrisina					1			1
Entalophoridæ:								
Mitoclema	1					1		2
Diploclema						1		1
Phaceloporidæ:								
Phacelopora						1		1
Ceramoporidæ:								
Ceramoporella						1	1	2
Crepipora	1		1		1			3
Cœloclema					1			1
Anolotichia	1							1
Ceramophylla			1					1
Bythotrypa						1		1
Scenellopora	1							1
Spatiopora			2		1			3
TREPOSTOMATA.								
Monticuliporidæ:								
Monticulipora	1		1	1	3			6
Atactoporella			3		1			4
Homotrypella			3	1	2			6
Homotrypa	3	1	4		3			11

Tables of genera and species—Continued.

TRENTON—Continued.

	Stones R.	Stones R. and Black R.	Black R.	Black R. and Trenton.	Trenton.	Stones R., Black R., Trenton.	Into Cincinnati.	Total.
TREPOSTOMATA—Continued.								
Monticuliporidæ:								
Prasopora[1]	......	......	3	1	8	......	......	13
Aspidopora	......	1	......	......	2	......	......	3
Mesotrypa	......	......	2	......	6	......	......	8
Amplexoporidæ:								
Amplexopora	......	......	......	......	1	......	......	1
Heterotrypidæ:								
Dekayella	......	1	4	......	1	......	......	6
Leptotrypa	2	......	1	......	1	......	......	4
Batostomellidæ:								
Bythopora	......	......	2	......	......	......	......	2
Eridotrypa	......	......	......	......	5	......	......	5
Constellariidæ:								
Constellaria	......	......	......	......	2	......	......	2
Stellipora	......	......	......	......	1	......	......	1
Nicholsonella	2	......	1	......	......	......	......	3
Trematoporidæ:								
Trematopora	......	......	3	......	2	......	......	5
Batostoma	2	1	7	1	2	......	......	13
Hemiphragma	......	......	......	1	1	1	......	3
Stromatotrypa	......	1	......	......	......	......	......	1
Monotrypa	1	......	......	......	4	......	......	5
Diplotrypa	......	......	......	......	3	......	......	3
Calloporidæ:								
Callopora	2	1	3	3	1	......	......	10
CRYPTOSTOMATA.								
Phylloporinidæ:								
Phylloporina	1	......	1	1	5	......	......	8
Drymotrypa	......	......	......	......	1	......	......	1
Arthrostylidæ:								
Arthrostylus	1	......	1	......	1	......	......	3
Helopora	2	......	1	......	2	......	......	5
Arthroclema	......	......	2	......	3	......	......	5
Nematopora	......	......	......	......	7	......	......	7

[1] One species Stones River and Trenton.

Tables of genera and species—Continued.

TRENTON—Continued.

	Stones R.	Stones R. and Black R.	Black R.	Black R. and Trenton.	Trenton.	Stones R., Black R., Trenton.	Into Cincinnati.	Total.
CRYPTOSTOMATA—Continued.								
Ptilodictyonidæ:								
Escharopora	4	1	2	......	2	......	......	9
Phænopora	......	......	......	......	1	......	......	1
Arthropora	......	1	1	......	1	......	......	3
Stictoporellidæ:								
Stictoporella	3	1	2	......	2	......	......	8
Stictopora	2	......	......	......	1	......	......	3
Rhinidictyonidæ:								
Rhinidictya	7	1	3	......	4	1	......	16
Eurydictya	......	......	......	1	1	......	......	2
Pachydictya	3	......	2	......	6	......	......	11
Phyllodictya	1	......	1	......	......	......	......	2
Trigonodictya	......	......	1	......	......	......	......	1
Total	41	11	59	12	93	8	1	226

CINCINNATI.

	Utica.	Utica and Lorraine.	Lorraine.	Lorraine and Richmond.	Richmond.	Utica, Lorraine, Richmond.	Utica, Richmond.	Total.
CTENOSTOMATA.								
Rhopalonariidæ:								
Rhopalonaria	......	......	......	1	......	......	......	1
Ascodictyonidæ:								
Vinella	......	......	1	......	......	......	......	1
CYCLOSTOMATA.								
Diastoporidæ:								
Stomatopora	1	......	......	1	1	2	......	5
Proboscina	1	......	......	2	......	......	......	3
Berenicea	1	......	......	1	......	......	......	2
Idmoneidæ:								
Protocrisina	......	......	......	......	1	......	......	1
Ceramoporidæ:								
Ceramoporella	1	1	......	1	3	1	......	7
Crepipora	2	......	2	......	1	......	......	5
Chiloporella	......	......	1	......	......	......	......	1

Tables of genera and species—Continued.

CINCINNATI—Continued.

	Utica.	Utica and Lorraine.	Lorraine.	Lorraine and Richmond.	Richmond.	Utica, Lorraine, Richmond.	Utica, Richmond.	Total.
CYCLOSTOMATA—Continued.								
Ceramoporidæ—Continued.								
Cœloclema	2		1					3
Anolotichia					1			1
Bythotrypa					1			1
Spatiopora	1		3	2	1			7
TREPOSTOMATA.								
Monticuliporidæ:								
Monticulipora			3		5			8
Atactoporella	2		4		1			7
Peronopora			1	1				2
Homotrypella					2			2
Homotrypa			2	2	1			5
Prasopora					1			1
Aspidopora	3							3
Mesotrypa					1			1
Amplexoporidæ:								
Amplexopora	2	1	4		1			8
Monotrypella	1				3			4
Discotrypa			1					1
Heterotrypidæ:								
Heterotrypa			5		4			9
Dekayella	3							3
Dekayia	1		4					5
Petigopora			3		1			4
Leptotrypa	2		7		1			10
Atactopora		1	1					2
Batostomellidæ:								
Bythopora	2		2		3			7
Eridotrypa					1			1
Lioclema					1			1
Lioclemella					5			5
Constellariidæ:								
Constellaria		1	2		4			7
Nicholsonella			1		1			2
Trematoporidæ:								
Batostoma	2				3			5
Hemiphragma	1				1			2

Tables of genera and species—Continued.

CINCINNATI—Continued.

	Utica.	Utica and Lorraine.	Lorraine.	Lorraine and Richmond.	Richmond.	Utica, Lorraine, Richmond.	Utica, Richmond.	Total.
TREPOSTOMATA—Continued.								
Trematoporidæ—Continued.								
Monotrypa	1				2			3
Diplotrypa					1			1
Calloporidæ:								
Callopora	4		5		1			10
Calloporella					3			3
CRYPTOSTOMATA.								
Phylloporinidæ:								
Phylloporina	1		1					2
Fenestellidæ:								
Fenestella					1			1
Arthrostylidæ:								
Arthrostylus	2							2
Helopora					3			3
Arthroclema					1			1
Sceptropora					1			1
Ptilodictyonidæ:								
Ptilodictya					6			6
Escharopora	1		4					5
Phænopora					1			1
Arthropora	1		1					2
Graptodictya					1			1
Stictoporellidæ:								
Stictoporella	1							1
Ptilotrypa					1			1
Rhinidictyonidæ:								
Rhinidictya	1				1			2
Eurydictya					2			2
Pachydictya					6			6
Dicranopora			1	1	2			4
Goniotrypa					1			1
CHILOSTOMATA.								
Paleschariidæ:								
Paleschara							1	1
Total	40	4	60	12	83	3	1	203

Genera with number of species present in Paleozoic formations.

	Ordovician.			Silurian.				Devonian.			Mississippian.				Carbon.		Total species.
	Chz.	Tr.	Cin.	An.	Cl.	Ni.	L. H.	Or.	U. H.	Ha.	Kl.	Os.	S. L.	Ch.	C. M.	Per.	
CTENOSTOMATA.																	
Rhopalonariidæ:																	
Rhopalonaria			1														1
Ascodictyonidæ:																	
Ascodictyon										2							2
Vinella		1	1			1											3
CYCLOSTOMATA.																	
Diastoporidæ:																	
Stomatopora		4	5			2											8
Proboscina		1	3							1							5
Berenicea		1	2			2											6
Diastoporina		1															1
Hederella									1	6							6
Hernodia										1							1
Reptaria										2							2
Idmoneidæ:																	
Crisinella									1								1
Protocrisina		1	1														1
Entalophoridæ:																	
Mitoclema		2															2
Clonopora									2	1							3
Diploclema		1				1											2
Cystopora										1							1
Phaceloporidæ:																	
Phacelopora		1															1
Ceramoporidæ:																	
Ceramopora					1	6	3										10
Ceramoporella		2	7														9
Crepipora		4	5														8
Chiloporella			1														1
Cœloclema		1	3														4
Anolotichia		1	1														2
Ceramophylla		1															1
Bythotrypa		1	1														2
Scenellopora		1															1
Spatiopora		3	7														10
Fistuliporidæ:																	
Fistulipora						4	6		2	43		3	2	1	2		62
Cyclotrypa										2							2
Eridopora										2				2			4
Pinacotrypa										7							7
Chilotrypa						4	2		1					1			8
Strotopora										1		2					3
Meekopora						1				1		1	1	3			6
Lichenotrypa										1							1
Buskopora									1	3							4
Glossotrypa										1							1
Selenopora										2							2
Favicella										2							2
Cœlocaulis							2		1								3
Botrylloporidæ:																	
Botryllopora										1							1

Genera with number of species present in Paleozoic formations—**Continued.**

	Ordovician.			Silurian.				Devonian.			Mississippian.				Carbon.		Total species.
	Chz.	Tr.	Cin.	An.	Cl.	Ni.	L. H.	Or.	U. H.	Ha.	Ki.	Os.	S. L.	Ch.	C. M.	Per.	
TREPOSTOMATA.																	
Monticuliporidæ:																	
Monticulipora		6	8							2							16
Atactoporella		4	7														11
Peronopora			2														2
Homotrypella		6	2														8
Homotrypa		11	5		1	1											18
Prasopora		13	1														14
Aspidopora		3	3		2												8
Mesotrypa		8	1			1											10
Amplexoporidæ:																	
Amplexopora		1	8														8
Monotrypella			4			1	3			1							9
Petalotrypa										2							2
Discotrypa			1							1							2
Heterotrypidæ:																	
Heterotrypa			9							2							11
Dekayella		6	3														9
Dekayia			5							1							6
Petigopora			4														4
Leptotrypa		4	10			1				1							16
Atactopora			2														2
Batostomellidæ:																	
Batostomella						2							1	3			6
Bythopora		2	7			1											10
Callotrypa							7		2	1							10
Trematella									1	4							5
Eridotrypa		5	1			1	1			2							10
Stenopora												6	2	4	5		17
Anisotrypa													2	2			4
Lioclema			1			4	3			15	2	2	3	1			29
Lioclemella			5		1												6
Constellariidæ:																	
Constellaria		2	7														9
Stellipora		1															1
Nicholsonella		3	2														5
Idiotrypa						1											1
Trematoporidæ:																	
Trematopora		5				5											10
Batostoma		13	5														18
Hemiphragma		3	2														5
Stromatotrypa		1															1
Monotrypa		5	3				6			1							15
Diplotrypa		3	1														4
Calloporidæ:																	
Callopora		10	10		1	1	1										23
Calloporella			3														3
CRYPTOSTOMATA.																	
Phylloporinidæ:																	
Phylloporina	3	8	2		1	1											15
Drymotrypa		1				2	1										4

Genera with number of species present in Paleozoic formations—Continued.

	Ordivician.			Silurian.				Devonian.			Mississippian.				Carbon.		Total species.
	Chz.	Tr.	Cin.	An.	Cl.	Ni.	L.H.	Or.	U.H.	Ha.	Ki.	Os.	S.L.	Ch.	C.M.	Per.	
CRYPTOSTOMATA—Cont'd.																	
Fenestellidæ:																	
Fenestella			1		1	7	14		12	28		23	5	4	19	1	111
Semicoscinium						2	3		4	17							26
Fenestrapora										3							3
Isotrypa									2								2
Loculipora						1	1		1	1							4
Unitrypa							4		7	5							16
Hemitrypa					1		2		3	2		6	3				16
Helicopora						1				1							2
Archimedes												3	1	12			16
Polypora						5	10	1	24	17		8	4	6	8	1	82
Lyropora												1		6			7
Fenestralia													2				2
Thamniscus						1	3		1	2		2		2	2		13
Phyllopora										1							1
Reteporidra									1	3							3
Reteporina									4	4				1			8
Ptiloporella						1			2	1							4
Ptiloporina									4								4
Acanthocladiidæ:																	
Pinnatopora									3	1		11			4		19
Acanthocladia															1		1
Septopora														6	6		11
Ptilopora										3		4	1				8
Ichthyorachis							1										1
Diploporaria														1	1		2
Sphragioporidæ:																	
Sphragiopora														1			1
Arthrostylidæ:																	
Arthrostylus		3	2														4
Helopora		5	3	3	1	1											12
Arthroclema		5	1														6
Sceptropora			1		1												2
Nematopora		7		5	1	3											15
Rhabdomesontidæ:																	
Rhombopora										3		12	3	6	5		29
Rhabdomeson																	
Cœloconus													1	1			2
Bactropora										2		1					3
Orthopora							8		1	17							26
Acanthoclema									4	1		1					6
Nemataxis									1	1							2
Tropidopora									1								1
Streblotrypa										2		9		3	1		15
Chainodictyonidæ:																	
Chainodictyon															2		2
Ptilodictyonidæ:																	
Ptilodictya			6	3	4	1	1		1								16
Escharopora		9	5														14
Clathropora					2	3			1								5
Phænopora		1	1	2	8		2										14

Genera with number of species present in Paleozoic formations—**Continued.**

	Ordovician.				Silurian.			Devonian.			Mississippian.				Carbon.		Total species.
	Chz.	Tr.	Cin.	An.	Cl.	Ni.	L. H.	Or.	U. H.	Ha.	Kl.	Os.	S. L.	Ch.	C. M.	Per.	
CRYPTOSTOMATA—Cont'd.																	
Ptilodictyonidæ—Cont'd.																	
Arthropora		3	2														5
Graptodictya			1														1
Stictoporina										3							3
Stictoporellidæ:																	
Stictoporella		8	1														9
Ptilotrypa			1														1
Intrapora										1		1		1			3
Coscinella										2							2
Tæniodictya									1			5	1				7
Stictopora	1	3															4
Heliotrypa														1			1
Rhinidictyonidæ:																	
Rhinidictya	1	16	2														19
Eurydictya		2	2														4
Pachydictya		11	6	2	7	1			*								25
Phyllodictya		2															2
Euspilopora										4							4
Dicranopora			4	1			1										5
Goniotrypa			1														1
Trigonodictya		1			1												2
Cystodictyonidæ:																	
Cystodictya									8	17		8	2		2		35
Dichotrypa										1			5				6
Coscinium									1	2		1			1		5
Tæniopora										5							5
Thamnotrypa									1								1
Semiopora										1							1
Ptilocella										1							1
Acrogenia										1							1
Prismopora									1	4				1	3		9
Scalaripora										5							5
Glyptopora												2	6	1			8
Phractopora										1		3					4
Ceramella										1							1
Evactinopora												4					4
Actinotrypidæ:																	
Actinotrypa												1					1
Cycloporidæ:																	
Cyclopora												2					2
Cycloporella												2					2
Proutella												1					1
Worthenopora												1	1				2
Rhinoporidæ:																	
Rhinopora					2												3
Diamesopora					1	4											5
Lichenalia																	1
Stictotrypa					1	3											3
CHILOSTOMATA.																	
Palescharidæ:																	
Paleschara			1			3	5			4							13

Genera with number of species present in Paleozoic formations—Continued.

SUMMARY OF SPECIES BY FAMILIES.

	Ordovician.			Silurian.				Devonian.			Mississippian.				Carbon.		Total species.
	Chz.	Tr.	Cin.	An.	Cl.	Ni.	L. H.	Or.	U. H.	Ha.	Ki.	Os.	S. L.	Ch.	C. M.	Per.	
CTENOSTOMATA.																	
Rhopalonariidæ	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1
Ascodictyonidæ	....	1	1	....	....	1	....	....	....	2	....	....	....	....	....	....	5
CYCLOSTOMATA.																	
Diastoporidæ	....	7	10	....	....	4	....	....	1	10	....	....	....	....	....	....	29
Idmoneidæ	....	1	1	....	....	....	....	....	1	....	....	....	....	....	....	....	2
Entalophoridæ	....	3	....	....	....	1	....	....	2	2	....	....	....	....	....	....	8
Phaceloporidæ	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
Ceramoporidæ	....	14	25	....	1	6	3	....	....	....	....	....	....	....	....	....	48
Fistuliporidæ	....	....	....	....	....	9	10	....	5	65	....	6	3	7	2	....	105
Botrylloporidæ	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	1
TREPOSTOMATA.																	
Monticuliporidæ	....	51	29	....	3	2	....	....	....	2	....	....	....	....	....	....	87
Amplexoporidæ	....	1	13	....	....	1	3	....	....	4	....	....	....	....	....	....	21
Heterotrypidæ	....	10	33	....	....	1	....	....	....	4	....	....	....	....	....	....	48
Batostomellidæ	....	7	14	....	1	8	11	....	3	22	2	8	8	10	5	....	97
Constellariidæ	....	6	9	....	....	1	....	....	....	....	....	....	....	....	....	....	16
Trematoporidæ	....	30	11	....	....	5	6	....	....	1	....	....	....	....	....	....	53
Calloporidæ	....	10	13	....	1	1	1	....	....	....	....	....	....	....	....	....	26
CRYPTOSTOMATA.																	
Phylloporinidæ	3	9	2	....	1	3	1	....	....	....	....	....	....	....	....	....	19
Fenestellidæ	....	....	1	....	2	18	37	1	65	85	....	43	15	31	29	2	20
Acanthocladiidæ	....	....	....	....	....	....	1	....	3	4	....	15	1	7	12	....	42
Sphragioporidæ	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1
Arthrostylidæ	....	20	7	8	3	4	....	....	....	....	....	....	....	....	....	....	39
Rhabdomesontidæ	....	....	....	....	....	....	8	....	7	26	....	23	4	10	6	....	84
Chainodictyonidæ	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	2
Ptilodictyonidæ	....	13	15	5	14	4	3	....	2	3	....	....	....	....	....	....	58
Stictoporellidæ	1	11	2	....	....	....	....	....	1	3	....	6	1	2	....	....	27
Rhinidictyonidæ	1	32	15	3	8	1	1	....	....	4	....	....	....	....	....	....	62
Cystodictyonidæ	....	....	....	....	....	....	....	....	11	39	....	18	13	2	6	....	86
Actinotrypidæ	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	1
Cycloporidæ	....	....	....	....	....	....	....	....	....	....	....	6	1	....	....	....	7
Rhinoporidæ	....	....	....	....	4	9	....	....	....	....	....	....	....	....	....	....	12
CHILOSTOMATA.																	
Palescharidæ	....	....	1	....	....	3	5	....	....	4	....	....	....	....	....	....	13

SUMMARY OF SPECIES BY SUBORDERS.

CTENOSTOMATA	....	1	2	....	....	1	....	....	....	2	....	....	....	....	....	....	6
CYCLOSTOMATA	....	26	36	....	1	20	13	....	9	78	....	6	3	7	2	....	194
TREPOSTOMATA	....	115	122	....	5	19	21	....	3	33	2	8	8	10	5	....	348
CRYTOSTOMATA	5	85	42	16	32	39	51	1	89	164	....	112	35	53	55	2	760
CHILOSTOMATA	....	....	1	....	....	3	5	....	....	4	....	....	....	....	....	....	13
Total	5	227	203	16	38	82	90	1	101	281	2	126	46	70	62	2	1,321

Families with number of genera present in Paleozoic formations.

	Ordovician.			Silurian.				Devonian.			Mississippian.				Carbon.		Total genera.
	Chz.	Tr.	Cin.	An.	Cl.	Ni.	L. H.	Or.	U. H.	Ha.	Ki.	Os.	S. L.	Ch.	C. M.	Per.	
CTENOSTOMATA.																	
Rhopalonariidæ			1														1
Ascodictyonidæ		1	1			1				1							2
CYCLOSTOMATA.																	
Diastoporidæ		4	3			2			1	4							7
Idmoneidæ		1	1						1								2
Entalophoridæ		2				1			1	2							4
Phaceloporidæ		1															1
Ceramoporidæ		8	7		1	1	1										10
Fistuliporidæ						3	3		4	11		3	2	4	1		13
Botrylloporidæ										1							1
TREPOSTOMATA.																	
Monticuliporidæ		7	8		2	2				1							8
Amplexoporidæ		1	3			1	1			3							4
Heterotrypidæ		2	6			1				3							6
Batostomellidæ		2	4		1	4	3		2	4	1	2	3	3	1		9
Constellariidæ		3	2			1											4
Trematoporidæ		6	4			1	1			1							7
Calloporidæ		1	2		1	1	1										2
CRYPTOSTOMATA.																	
Phylloporinidæ	1	2	1		1	2	1										2
Fenestellidæ			1		2	7	7	1	12	13		6	5	6	3	2	18
Acanthocladiidæ							1		1	2		2	1	2	4		6
Sphragioporidæ														1			1
Arthrostylidæ		4	4	2	3	2											5
Rhabdomesontidæ							1		4	6		4	2	3	2		8
Chainodictyonidæ															1		1
Ptilodictyonidæ		3	5	2	3	2	2		2	1							7
Stictoporellidæ	1	2	2						1	2		2	1	2			7
Rhinidictyonidæ	1	5	5	2	2	1	1			1							8
Cystodictyonidæ									4	11		5	3	2	3		14
Actinotrypidæ												1					1
Cycloporidæ												4	1				4
Rhinoporidæ					3	4											4
CHILOSTOMATA.																	
Paleschariidæ			1			1	1			1							1

SUMMARY OF GENERA BY SUBORDERS.

CTENOSTOMATA		1	2			1				1							3
CYCLOSTOMATA		16	11		1	7	4		7	18		3	2	4	1		38
TREPOSTOMATA		22	29		4	11	6		2	12	1	2	3	3	1		40
CRYPTOSTOMATA	3	16	18	6	14	18	13	1	24	36		24	13	16	13	2	86
CHILOSTOMATA			1			1	1			1							1
Total	3	55	61	6	19	38	24	1	33	68	1	29	18	23	15	2	168

GENERAL NOTES.

VALUE OF BRYOZOA IN STRATIGRAPHIC WORK.

The value of the bryozoa in stratigraphic work has scarcely yet begun to be appreciated. In American Paleozoic strata they are preeminently the fossils to be relied upon in correlation work. They are nearly always abundant, and even when poorly preserved exteriorly can be identified by microscopic sections. Crinoids and crustacea are usually too scarce; mollusca, abundant in some formations, are almost wanting in others, and likely to be poorly preserved; vertebrate remains are too few, and usually local in distribution. The brachiopods are also usually abundant in all Paleozoic strata, but have commonly too great a range vertically to be trusty guides in close work.

Because to the unaided eye there seems little variation of form among the bryozoa, they have been generally neglected by collectors and geologists. Early writers are also to some extent responsible for this neglect, for they failed to discriminate the different species, and made a few names, such as *Chætetes lycoperdon*, *Stenopora fibrosa*, etc., serve for a multitude of diverse forms. It is no doubt true, and this is another cause for the neglect of the bryozoa, that their discrimination does require good powers of observation and careful, often tedious, study. Furthermore, the number of species is appalling. Somewhat more than 1,300 species have been described from American Paleozoic formations, yet these are probably but a half or a third of the distinguishable forms present. These various considerations compel greater labor for the mastery of the bryozoa than for any other class. The determination—at least the first determination—of a species often, and among the Trepostomata nearly always, requires the preparation of microscopic sections, a tedious operation at best. However, when once a species has been thoroughly worked out, it can generally be distinguished externally from associated forms of similar appearance by quite constant differences, which often seem trifling, and yet are doubtless of morphological importance.

A beginning only has been made in the work of determining the geographical distribution of species and genera and elucidating the many obscure questions regarding the migration of faunas in the ancient seas, their extinction or evolution, their reapparition, and like phenomena.

COLLECTION AND STUDY.

In sandstone formations bryozoa—and this is true of most other fossils as well—are practically wanting, but there is scarcely a limestone formation, especially if there be shale alternations, in which they are not abundant. Generally they are calcareous, and in this condition are easily sectioned for microscopic study. Sometimes, however, they are found silicified. Then the internal structure is to a greater or less extent obliterated, and they can rarely be successfully sectioned for study. Sometimes their substance has been dissolved away, leaving a perfect mold in the matrix. A gutta-percha impression will then often give a very satisfactory idea of the exterior of the original fossil.

The best specimens are usually obtained from the shales between or just above or below limestone layers. The smaller forms may be obtained free by carefully washing the shales and picking them out from the débris. Some kinds of shales or clay will wash away better if first allowed to become thoroughly dry. Others do better if allowed to soak in water for a longer or a shorter period of time.

Often the surface characters are obscured by the clayey matrix. This may be removed by the use of caustic potash. The deliquescence of small pieces of this substance, which needs to be handled gingerly with unprotected hands, laid upon the fossil loosens the clay, which is then easily brushed off. Some workers accomplish the same result by placing their specimens in a saturated solution of Glauber's salts, which in crystallizing loosens the clay.

MAKING OF SECTIONS.

The preparation of thin sections for microscopic examination is indispensable if one would understand the bryozoa. Directions for making sections of fossil bryozoa, more particularly the Paleozoic, are given in the report of the Geological Survey of Illinois, VIII, 1890, p. 292, and in the Geology of Minnesota, III, 1893, p. 100, and with a few additional notes are here repeated. Some experience and considerable care are required to produce satisfactory sections. In the absence of a lathe or machine for cutting rock sections, the following method will give as good and, with experience, even better results than the lathe.

The materials required are (1) a piece of sandstone, not too gritty, 8 or 10 inches wide, 18 or 20 inches long, and of sufficient thickness to insure stability; (2) a water hone 1 inch thick, a little wider, and 4 or 5 inches long; (3) a block of wood (walnut is the best) 1 inch thick, 2 inches wide, and $4\frac{1}{2}$ inches long. The edges of the upper side of this block should be rounded to fit the hand, while in the lower side a shallow excavation $1\frac{1}{16}$ by $3\frac{1}{8}$ inches is made to fit the ordinary glass slip. The excavation must be so made that the central portion of the glass slip will bear upon the block, while the ends may have a little play.

The procedure for sectioning specimens large enough to be handled without difficulty is as follows: With a strong pair of "wire nippers" a fragment is pinched from the specimen to be sectioned. This fragment is rubbed upon the sandstone until the surface is perfectly flat. In doing this the greatest care must be exercised to retain or obtain, as the case may be, the desired angle. This surface is smoothed upon the hone, and the fragment is ready for mounting. A drop of Canada balsam is placed upon the center of a glass slip of the usual size, which, for economy's sake, may be cut from ordinary window glass, and the smoothed face of the fragment upon it. The slip is now heated on a heating stage or over a lamp and the Canada balsam allowed to boil for a certain time, the length of which must be learned by experience. The thickness of the glass and the amount of gum are factors to be considered, but in general it may be stated that with a slide of average thickness and a medium amount of gum the boiling is complete when the edges of the balsam commence to turn brown. The slip is then laid upon a horizontal piece of wood to cool. After it is cold the balsam should be tested. The exact hardness required must be intermediate between brittleness and the point where the finger nail can make an impression upon it. If too soft, the slip must be carefully reheated; if too hard, fresh gum and reheating may suffice, but it is better to remove the fragment, clean it and the slide, and remount. If of the proper hardness, the slip is placed in the excavation of the block, which has been dipped into water to secure adhesion, and the superfluous material is rubbed away upon the sandstone. When nearly thin enough the slide is taken out of the block and finished upon the hone. As the glass slip has become scratched and generally unsightly during the foregoing process, the section may be transferred to a good slip, mounted, and covered in the usual way for permanent preservation. The slide should be carefully labeled, so that it can always be known from which particular specimen the section was made.

Specimens too small to be worked in the manner above described—as, for example, small forms of Bythopora, Rhombopora, or Streblotrypa—may be sectioned in the following way: Place a little balsam on a slip and heat it, but only enough to partially harden it. Into this heated balsam place several specimens without any rubbing. After cooling rub down a little carefully; reheat cautiously, and with a sharp-pointed instrument turn one or more specimens so that the smoothed face is against the glass. Now cool and rub down farther. Again cautiously reheat, and turn the specimens which have not yet been turned. After cooling rub again until the sections are thin enough for microscopic examination, and finish as before.

These sections must be prepared with a knowledge of certain structural features. The zoarium of most bryozoa is composed of two zones, an inner, in which the zoœcia are immature, and an outer or peripheral, in which the zoœcia are in the mature state, and accessory features, such as acanthopores and mesopores, are developed. To observe all these features usually three sections are needed, a vertical, or, in ramose or frondescent forms, a longitudinal parallel with the axis, a transverse, which cuts across the axis, and a tangential, which is parallel to the surface and close enough to it to show the structures developed in the peripheral region. Of bifoliate forms two tangential sections are needed, one close to the surface and another near the middle (mesotheca), though often one tangential section may be made so as to show all the features.

Care must be taken to select specimens that have not suffered from compression. Sections of specimens compressed or otherwise distorted have occasionally given rise to grave errors, as, for example, when Waagen and Wentzel, misled by sections of specimens of the Fistuliporidæ with the axial region crushed, believed they had found evidence of the development of zoœcia from the intermediate cœnenchymal (vesicular) tissue.

BIBLIOGRAPHY AND INDEX.

CHRONOLOGICAL CATALOGUE OF PAPERS CONTAINING DESCRIPTIONS AND ILLUSTRATIONS OF AMERICAN PALEOZOIC BRYOZOA.

[Papers in which an asterisk (*) precedes the name of the author are of special importance to the student of bryozoa.]

1832.

Eaton, Amos. Geological Text-book for aiding the study of North American Geology, edition 2, 1832. 134 pp. Paleontology, 22 pp., 5 pls.

Contains a brief description of Flustra carbaseoides, n. sp. The name has not come into use.

1840.

Troost, Gerard. Organic remains discovered in the strata of Tennessee. (Fifth Geol. Rep. Tennessee, 1840, pp. 45–76.)

This is known as "Troost's Catalogue." Two species of bryozoa, Escharia ovatopora and reticulata, are in the list, but the descriptions are so inadequate that they have never since been recognized.

1842.

Orbigny, Alcide d'. Voyage dans l'Amérique Méridionale. Tome III. Paris, 1842.

In this work Ceriopora ramosa and Retepora flexuosa are described from the Carboniferous of Bolivia. These are the only Paleozoic bryozoa made known from South America, so far as we know, but it is doubtful whether the forms can be recognized from the descriptions or figures without material from the typical locality.

Owen, David Dale. Regarding human footprints in solid limestone. (Amer. Jour. Sci. Arts, ser. 1, XLIII, p. 19, fig. 2.)

The author gives a figure of Archimedes, calling it Retepora Archimedes, and states that the name was given by Leseuer. The latter, however, seems never to have published the name.

Vanuxem, Lardner. Geology of New York, Part III, comprising the survey of the third geological district. Albany, 1842.

On page 46 a figure is given of the "puff-ball Favosite (Favosites lycopodites)" from the Trenton. The form can not be identified.

1843.

Castelnau, F. de. Essai sur le Système Silurien de l'Amérique Septentrionale. Paris, 1843, 56 pp., 25 pls.

Contains—

- **Gorgonia repisteria** (Goldfuss), p. 50, pl. xxiv, 3; from Schoharie, New York.
- **Gorgonia anticorum** n. sp., p. 50, pl. xxiv, 1; from Lake Huron.
- **Gorgonia siluriana** n. sp., p. 50; from Lake Huron.
- **Eschara scalpellum** (Murchison), p. 50; from Isles Mantoulines.

The descriptions are so meager that no one has succeeded in identifying any of these forms.

1846.

Dana, James D. Zoophytes. (Wilkes's U. S. Exploring Expedition, VIII, Philadelphia, 1846, 740 pp., 61 plates in atlas.)

This work contains a description of Lonsdale's genus Stenopora and of a new genus Constellaria (p. 537), both being considered corals by the author. The latter was established for a species named Ceriopora constellata on plates of Western Fossils by Van Cleve. The form was later erroneously identified as the Stellipora antheloidea of Hall and became currently known as Constellaria antheloidea, Dana's name Constellaria having replaced Hall's Stellipora.

1847.

***Hall, James.** Paleontology of New York, Vol. I. Albany, 1847. 338 pp., 98 pls.

About twenty new species of bryozoa from the Trenton and Chazy periods are described in this greatest of early works on American paleontology. The new genera established are Stictopora, Escharopora, and Stellipora. As is usual with the early work on fossil bryozoa, both the descriptions and the figures leave much to be desired. Even to-day several of the species are not satisfactorily recognized, while the number and diversity of distinguishable forms referred to "Chætetes lycoperdon" is distressing to the modern student.

1850.

Orbigny, Alcide d'. Prodrome de Paleontologie, Tome I. Paris, 1850.

In this extensive catalogue the following American paleozoic bryozoa are listed: Ptilodictya cruciformis, Ptilodictya pavonia, Sulcopora fenestrata, Subretepora reticulata, Enallopora perantiqua, Constellaria antheloidea, and the new genus Monticulipora with the species mammulata, ramosa, frondosa, and filiasa. Most of the names are accompanied by quite inadequate descriptive remarks, and the validity of those now recognized depends upon the work of subsequent authors. Sulcopora, Subretepora, and Enallopora are new generic terms founded not upon the fossils themselves, but upon Hall's incorrect descriptions and figures of Stictopora fenestrata, Intricaria reticulata and Gorgonia perantiqua, respectively. Resting, therefore, upon fictitious characters, these names have deservedly failed to gain recognition.

1851.

Hall, James. Description of new or rare species of fossils from the Paleozoic series. (Foster and Whitney's Report on the Geology of the Lake Superior Land District, 1851. Bryozoa, pp. 206–208, pls. xxiv, xxv.)

Among the descriptions occur three of bryozoa: Phænopora multipora, Clathropora flabellata n. sp., and Chaetetes lycoperdon Say.

Hall, James. New Genera of fossil Corals. (Amer. Jour. Sci. Arts, ser. 2, XI, 1851, pp. 398–401.)

The following new genera, which soon appeared more fully described in Paleontology of New York, II, are described for the first time: Helopora, Phænopora, Rhinopora, Callopora, Trematopora, Clathropora, Ceramopora, Lichenalia, Sagenella.

Milne-Edwards, Henri, and **Haime, Jules.** Monographie des Polypiers Fossiles des Terrains Paléozoiques. (Archives du Museum, V, 1851, 502 pp., 20 pls.)

The following bryozoa from America are described: Chætetes filiasa (d'Orbigny), dalii n. sp., ramosus (d'Orbigny), mammulatus (d'Orbigny), frondosus (d'Orbigny), pavonia (d'Orbigny), tuberculatus n. sp., rugosus n. sp., Dekayia n. gen., D. aspera n. sp., Constellaria Dana, C. antheloidea (Hall).

Rolle, Friedrich. Ueber zwei neue devonische Korallen einer neuen Sippe, Reptaria. (Leonhard und Bronn's Neues Jahrbuch, 1851, pp. 810–814, pl. ixB.)

Describes the new genus Reptaria with two species, R. orthoceratum n. sp., from the Eifel of Germany, and R. stolonifera n. sp., from Cazenovia, New York.

1852.

* **Hall, James.** Paleontology of New York, Vol. II. Albany, 1852. Bryozoa, pp. 40–52, 144–173, pls. xvii–xix, xl–xlE.

This work gives a full account as then known of the bryozoa of the Clinton and Niagara groups of New York. About forty species are described, which, with few exceptions, are easily identified from the descriptions and figures. The following are characterized as new genera: Helopora, Phænopora, Rhinopora, Callopora, Trematopora, Clathropora, Ceramopora, Lichenalia, Sagenella. Species are also described referred to Chætetes, Stictopora, Retepora, Fenestella, Diamesopora (a new genus whose characterization is reserved for future study), Hornera, Polypora.

1854.

Milne-Edwards, Henri, and **Haime, Jules.** A Monograph of the British fossil Corals. (Publications Palæontographical Society, London, 1854.)

In a footnote on page 265 the authors refer to the genus Monticulipora the following forms, which, in their French work (Monographie des Polypiers Fossiles des Terrains Paleozoiques, pp. 266-279), they had referred to Chætetes: M. filiasa d'Orbigny, C. Dalei Milne-Edwards and Haime, M. ramosa d'Orbigny, M. mammulata d'Orbigny, M. frondosa d'Orbigny, Ptilodictya pavonia d'Orbigny, C. rugosus Milne-Edwards and Haime. They also describe the genera Fistulipora M'Coy and Stenopora Lonsdale.

Shumard, Benjamin F. Description of the species of Carboniferous and Cretaceous fossils collected. (Marcy's Report of the U. S. Exploration of the Red River of Louisiana, 1854, Appendix E, pp. 186–199, 6 pls.)

Archimedipora archimedes (page 175, pl. i, 6) is described.

1857.

* **Hall, James.** Remarks upon the genus Archimedes, or Fenestella, from the Carboniferous limestones of the Mississippi Valley. (Amer. Jour. Sci. Arts, ser. 2, XXIII, pp. 203–204.)

This paper contains a general discussion of characters and relationship of Archimedes and Fenestella.

* **Hall, James.** Observations on the genus Archimedes, or Fenestella, with description of species. (Proc. Amer. Assoc. Adv. Sci., X, 1857, pp. 176–180.)

Archimedes and Lyropora are defined as subgeneric terms under Fenestella, and the following species are described: Fenestella (Archimedes) Owenana, Wortheni, Swallovana, Meekana, laxa, Fenestella (Lyropora) lyra, quincuncialis, subquadrans. Unfortunately no figures accompany the paper.

1858.

Hall, James. Geological Survey of Iowa. Volume I, Part II, Paleontology, 1858. Bryozoa, pp. 651–653, pl. xxii.

Descriptions and good figures are given of Archimedes wortheni, reversa n. sp., Ptylopora prouti n. sp., and a description only of Callopora punctata n. sp.

* **Prout, Hiram A.** Description of new species of Bryozoa from Texas and New Mexico. (Trans. St. Louis Acad. Sci., I, 1858, pp. 228–235.)

Describes the following species from Carboniferous and Permian formations: Fenestella tritulberculata, Popeana, corticata, intermedia, variabilis, Shumardii, Norwoodiana, subretiformis, Eschara? concentrica, ? tuberculata. No illustrations were given. Some of these may never be identified.

* **Prout, Hiram A.** First of a series of descriptions of Carboniferous Bryozoa. (Trans. St. Louis Acad. Sci., I, 1858, pp. 235–237, pl. xv.)

Describes Fenestralia n. subg., F. St. Ludovici, Fenestella plumosa, Polypora varsoviensis.

* **Prout, Hiram A.** Second series of descriptions of Bryozoa, from the Paleozoic rocks of the Western States and Territories. (Trans. St. Louis Acad. Sci., I, 1858, pp. 266–273, pls. xv, xvi.)

Contains descriptions of Coscinium Keyserling, C. cyclops Keyserling, cribriformis Prout, Keyserlingi Prout, Polypora Mexicana Prout, Shumardii Prout, intermedia Prout.

Swallow, George C. Fossils of the Permian rocks of Kansas. (Trans. St. Louis Acad. Sci., I, 1858, pp. 178–197.)

Proposes the name Synocladia biserialis for a form which he thinks may be Synocladia virgulacea Phillips, and the name Acanthocladia americana for a form which he thinks may be Acanthocladia anceps ? Schlotheim. Also notes a form which he refers to Phyllopora ehrenbergi Geinitz.

1859.

Billings, E. Fossils of the Chazy Limestone, with descriptions of new species. (Canadian Naturalist and Geologist, IV, 1859, pp. 426–470.)

Contains rather brief descriptions of the monticuliporoids Stenopora adherens and patula.

* **Prout, Hiram A.** Third series of descriptions of Bryozoa from the Paleozoic rocks of the Western States and Territories. (Trans. St. Louis Acad. Sci., I, 1859, pp. 443–452, pls. xvii, xviii.)

Contains descriptions of Semicoscinium n. g., S. rhomboideum n. sp., Fenestella hemitrypa n. sp., Limaria Steininger, L. falcata n. sp., Flustra spatulata n. sp., tuberculata n. sp., Septopora n. g., S. Cestriensis n. sp., Polypora tuberculata n. sp., biarmica Keyserling, Fenestella banyana n. sp.

1860.

Hall, James. Descriptions of new species of fossils from the Silurian rocks of Nova Scotia. (Canadian Naturalist and Geologist, V, 1860, pp. 144–159.)

The author notes the occurrence of a variety of Helopora fragilis, which he names var. acadiensis, from the "Arisaig Series."

Milne-Edwards, H. Histoire Naturelle des Coralliaires ou polypes propriement dits. Tome III. Paris, 1860. [Monticuliporoids, pp. 272–284.]

In this work the descriptions are repeated of the American forms described in the joint work of Milne-Edwards and Haime, Monographie des Polypiers Fossiles des Terrains Paleozoiques, 1851.

* **Prout, Hiram A.** Fourth series of descriptions of Bryozoa from the Paleozoic rocks of the Western States and Territories. (Trans. St. Louis Acad. Sci., I, 1860, pp. 571–581.)

Contains descriptions, without figures, of Coscinium Wortheni n. sp., elegans n. sp., plumosum n. sp., Michelinia n. sp., saganella n. sp., tuberculatum n. sp., asteria n. sp., escharense, n. sp., Cyclopora n. g., C. fungia n. sp., discoidea n. sp., polymorpha n. sp., Jamesii n. sp., Semicoscinium Eriense n. sp., tuberculatum n. sp., Polypora Halliana n. sp., gracilis n. sp.

Some of these appear again, with figures, in Geological Survey of Illinois, II. Considering the early date at which Prout's work was done, it is of a very high order.

Roemer, Ferdinand. Die Silurische Fauna des westlichen Tennessee. Breslau, 1860. 97 pp., 5 pls.

Two species of bryozoa from the Niagara of Tennessee are described: Thecostegites hemisphæricus n. sp., and Fenestella acuticosta n. sp.

1862.

Billings, E. Paleozoic Fossils. Volume I, 1862. (Geological Survey of Canada.)

Contains descriptions of Arthroclema n. g., and A. pulchella n. sp. (pp. 54–55). The descriptions are very good considering the date.

1863.

Winchell, Alexander. Descriptions of fossils from the yellow sandstones lying beneath the "Burlington limestone" at Burlington, Iowa. (Proc. Acad. Nat. Sci. Philadelphia, 1863, pp. 2–25.)

Describes Trematopora ? vesiculosa n. sp. and Trematopora ? fragilis n. sp.

1865.

Billings, E. Notice of some new genera and species of Paleozoic fossils. (Canadian Naturalist, new ser., II, 1865, pp. 425–432.)

Contains a meager description of Stenopora bulbosa, a massy monticuliporoid.

Meek, F. B. and Worthen, A. H. Description of new species of Crinoidea, etc., from the Paleozoic rocks of Illinois and some adjoining States. (Proc. Acad. Nat. Sci. Philadelphia, 1865, pp. 155–166.)

Characterize Evactinopora (nov. gen.) radiata n. sp. (p. 165).

1866.

* **Billings, E.** Catalogue of the Silurian fossils of the Island of Anticosti, with descriptions of some new genera and species. (Geological Survey of Canada, Montreal, 1866. 93 pp.)

Contains descriptions of the following new species: Ptilodictya fragilis, nitidula, canadensis, gladiola, excellens, sulcata, superba, rustica, tenera, arguta, alcyone, Helopora lineata, formosa, concava, strigosa, nodosa, lineopora, armata, bellula, striatopora, irregularis, Circe, varipora.

The descriptions give no structural details. Some of the forms it may not be possible to recognize; a few others may prove to be synonyms.

* **Prout, Hiram A.** Descriptions of new species of Bryozoa. (Trans. St. Louis Acad. Sci., II, 1866, pp. 410–413.)

The species described are Fenestella nodosa, dilata, bifurcata, Polypora imbricata, rigida, Retepora hamiltonensis, Ptilodictya (Stictopora) variabilis.

* **Prout, Hiram A.** Descriptions of Polyzoa from the Paleozoic rocks. (Geological Survey of Illinois, II, 1866, pp. 412–423, pls. xxi, xxii.)

Gives descriptions with figures of Coscinium Wortheni, elegans, plumosum, Michelinia, saganella, tuberculatum, asteria, Cyclopora, C. fungia, discoidea, polymorpha, Polypora Halliana, gracilis, Hamiltonensis. These had all but the last previously appeared in the Trans. St. Louis Acad. Sci., I, 1860.

* **Rominger, Carl.** Observations on Chætetes and some related genera, in regard to their systematic position, with an appended description of some new species. (Proc. Acad. Nat. Sci. Philadelphia, 1866, pp. 113–123.)

After a general discussion descriptions are given of a number of species, including, besides the Stellipora antheloidea Hall, Trematopora tubulosa Hall, Ceramopora foliacea Hall, the following new species: Chætetes quadratus, decipiens, Callopora missouriensis, Fistulipora neglecta, Halli, lunata, helios, stellifera, sulcata, minuta, acervulosa, spinulifera, Eriensis, utriculus, crassa, elegans, Spergenensis, flabellum, trifolia, compressa, peculiaris. The descriptions are unaccompanied by figures, but are usually sufficient for identification—a decided merit in a work of that date. .

Winchell, Alexander. A report on the Lower Peninsula of Michigan. Ann Harbor, 1866. 97 pp. Paleontology, pp. 83–97.

Brief descriptions of the following bryozoa are included: Fistulipora labiosa, Saffordi, Callopora punctillata, Chætetes Hamiltonensis, microscopica, Fenestella eximia, filitexta, Stictopora sulcata.

1867.

Geinitz, Hans Bruno. Carbonformation und Dyas in Nebraska. (Verhandlungen der kais. Leopoldino-Carolinischen Deutschen Akademie der Naturforscher, XXXIII, 1867, pp. i-xii, 1-91, 5 pls.) Also separate, Dresden, 1866, 4to. Bryozoa, pp. 66-72, pl. v.

The author identified Permian forms from Nebraska with forms from the Dyas of Europe. Meek later showed that the identifications were erroneous.

1868.

Dawson, J. W. Acadian Geology, edition 2. Montreal, 1868. Bryozoa, pp. 287-289.

Contains rather meager descriptions of Stenopora exilis n. sp., Chætetes tumidus Milne-Edwards and Haime, Fenestella lyelli n. sp.

Meek, F. B., and Worthen, A. H. Paleontology of Illinois. (Geological Survey of Illinois, III, 1868.) Bryozoa, pp. 501-504.

Descriptions are given of Evactinopora and three species—E. radiata, sexradiata, grandis, and of Fenestella (Lyropora) retrorsa.

1869.

Safford, J. M. Geology of Tennessee. Nashville, 1869.

On page 286 the following new species are named: Ptilodictya symmetrica, explicans, multiramis, ? Libana; the last one is very briefly characterized.

1870.

* **Meek, F. B., and Worthen, A. H.** Note on the relations of Synocladia King 1849 to the proposed genus Septopora Prout 1858. (Proc. Acad. Nat. Sci. Philadelphia, 1870, pp. 15-18.)

1871.

Meek, F. B. Description of new species of invertebrate fossils from the Carboniferous and Devonian rocks of Ohio. (Proc. Acad. Nat. Sci. Philadelphia, 1871, pp. 57-93.)

Contains a description of Ptilodictya (Stictopora) Gilberti.

Meek, F. B. Descriptions of new western Paleozoic fossils mainly from the Cincinnati group of the Lower Silurian series of Ohio. (Proc. Acad. Nat. Sci. Philadelphia, 1871, pp. 308-336.)

Contains a description of Ptilodictya (Stictopora) Shafferi.

1872.

Meek, F. B. Paleontological Report. (Hayden's Sixth Ann. Rep. U. S. Geol. Sur. of the Territories, 1872, pp. 431-518.)

Contains description of Ptilodictya (Stictopora) dictyota.

* **Meek, F. B.** Report on the Paleontology of Eastern Nebraska, with some remarks on the Carboniferous rocks of that district. (Hayden's Final Report of the U. S. Geol. Sur. of Nebraska and portions of adjacent Territories. Washington, 1872. 264 pp., 11 pls. Part II, Paleontology, pp. 81-264.) Bryozoa, pp. 141-158.

The author gives full and critical descriptions and figures of Fenestella sp. (Fenestella plebeia (Geinitz), Shumardi Prout, submarginata Meek, Polypora sp. ind., Synocladia biserialis Swallow, Glauconome trilineata Meek, Rhombopora Meek, R. lepidodendroides Meek, and Fistulipora nodulifera Meek.

1873.

Hall, James, and **Whitfield, R. P.** Descriptions of new species of fossils from the Devonian of Iowa. (Twenty-third Annual Report New York State Museum Nat. Hist., 1873, pp. 223–239, 5 pls.)

Contains descriptions of Fistulipora occidens n. sp. and Stomatopora ? alternata n. sp.

Meek, F. B. Descriptions of invertebrate fossils of the Silurian and Devonian systems. (Paleontology of Ohio, I, 1873, pp. 1–243, pls. i–xxii.)

Contains descriptions of Ptilodictya (Stictopora) Shafferi, Gilberti, lichenoides.

1874.

Billings, E. Paleozoic Fossils, Vol. II, Part I, 1874. 144 pp., 9 pls. (Memoirs of the Geological Survey of Canada.)

Contains descriptions of two species of bryozoa from the Gaspé limestone of Canada, Polypora ? Psyche n. sp., and Ptilodictya tarda n. sp.

* **Hall, James.** Descriptions of Bryozoa and Corals of the Lower Helderberg group. (Twenty-sixth Ann. Rep. New York State Museum Nat. Hist., 1874, pp. 93–115.)

This paper is devoted to the bryozoan fauna of the Lower Helderberg group. Descriptions only are given. Figures and fuller descriptions are later given in the Paleontology of New York, VI. Thirty-four new species are described, referred to the genera Fenestella, Polypora, Hemitrypa, Ichthyorachis, Escharopora, Callopora, Trematopora, Ceramopora, Chætetes, and Paleschara, the last a new genus whose systematic position is still somewhat doubtful.

* **Miller, S. A.** Observations upon Stenopora fibrosa and the genus Chætetes. (Cincinnati Quarterly Journal of Science, I, 1874, pp. 368–375.)

After a general discussion the writer gives descriptions of Stenopora Lonsdale, Stenopora fibrosa Goldfuss 1826 from Lexington, Kentucky, Stenopora lycoperdon Say, Chætetes Fischer, Chætetes petropolitanus (Pander). These are all incorrect identifications.

* **Nicholson, H. Alleyne.** Summary of recent researches on the Paleontology of the Province of Ontario, with brief descriptions of some new genera. (Canadian Journal, new ser., XIV, 1874, pp. 125–136.)

The new genera Cryptopora, Carinopora, Tæniopora, and Botryllopora are described.

* **Nicholson, H. Alleyne.** Descriptions of two new genera and species of Polyzoa from the Devonian rocks. (Ann. Mag. Nat. Hist., ser. 4, XIII, 1874, pp. 77–85.)

The author describes Cryptopora n. g. with the new species C. mirabilis and Carinopora n. g. with the species Hindei n. sp. Both genera have proved untenable, being founded upon imperfect material in a peculiar state of preservation.

Nicholson, H. Alleyne. Descriptions of new fossils from the Devonian formation of Canada West. (Geol. Mag. new ser., I, 1874, pp. 10–16, 54–60, 117–126, 159–163, 197–201, pls. ii, iv, vi, ix.)

This series of papers contains the descriptions of a large number of Corniferous and Hamilton fossils, including bryozoa, which are incorporated in the author's Report on the Paleontology of the Province of Ontario, 1874.

* **Nicholson, H. Alleyne.** Descriptions of species of Chætetes from the Lower Silurian rocks of North America. (Quar. Jour. Geol. Soc. London, XXX, 1874, pp. 499–515, pls. xxix, xxx.)

The author gives a description of Stenopora Lonsdale and nineteen species of Monticuliporoids mainly from the Cincinnati group of Ohio, all of which he refers to the genus Chætetes. These are all redescribed in the Paleontology of Ohio, vol. II, which made its appearance in the following year.

* **Nicholson, H. Alleyne.** Report upon the Paleontology of the Province of Ontario, Toronto, 1874. 133 pp., 8 pls.

The author describes the following genera with from one to four species under each: Aulopora (= Hederella), Chætetes, Callopora, Fistulipora, Botryllopora, Ptilodictya, Polypora, Retepora, Cryptopora, and Fenestella.

* **Nicholson, H. Alleyne,** and **Hinde, George Jennings.** Notes on the fossils of the Clinton, Niagara, and Guelph formations of Ontario, with descriptions of new species. (Canadian Journal, new ser., XIV, 1874, pp. 137–144.)

Descriptions are given of species referred to Chætetes, Helopora, Rhinopora, Phænopora, Ptilodictya, Clathropora. The work is, in the main, repeated in the Report upon the Paleontology of the Province of Ontario, 1875.

White, Charles A. Preliminary report upon invertebrate fossils with descriptions of new species. (Wheeler's Geographical and Geological Exploration and Survey west of the 100th meridian.) Washington, 1874. 27 pp.

Contains descriptions of Glauconome nereidis sp. nov. and Polypora stragula sp. nov.

1875.

Hall, James, and **Whitfield, R. P.** Descriptions of invertebrate fossils mainly from the Silurian system. (Paleontology of Ohio, II, 1875, pp. 67–161, pls. i–ix.)

Several bryozoa from the Clinton of Ohio are described: Retepora angulata? Hall, Rhinopora frondosa n. sp., Stictopora magna n. sp., Clathropora clintonensis n. sp., Phænopora (Ptilodictya) expansa.

* **James, U. P.** Catalogue of Lower Silurian fossils at Cincinnati, Ohio, and vicinity, with descriptions of some new species of corals and polyzoa. Cincinnati, 1875. 8 pp.

The introduction to the catalogue proper contains descriptions of the following new species from the Cincinnati group: Chætetes? calycula, clavacoideus, Cincinnatiensis, ? O'Nealli, Ceramopora Nicholsoni, Ptilodictya acuminata, Alecto nexilis.

Meek, F. B. A report on some of the invertebrate fossils of the Waverly group and Coal Measures of Ohio. (Paleontology of Ohio, II, 1875, pp. 269–347, pls. x, xiv–xx.)

Contains descriptions of Fenestella delicata Meek, multiporata? var. Lodiensis Meek, Synocladia biserialis Swallow, Ptilodictya (Stictopora) **serrata Meek, Ptilodictya** (Stictopora) carbonaria Meek.

Meek, F. B., and **Worthen, A. H.** Paleontology of Illinois. Descriptions of invertebrates. (Geological Survey of Illinois, VI, 1875, pp. 491–532, pls. xxiii–xxxii.)

Contains description of one bryozoan, Chætetes ? carbonaria Worthen.

Miller, S. A. Some new species of fossils from the Cincinnati group and remarks upon some described forms. (Cincinnati Quarterly Journal Science, II, 1875, pp. 349–355.)

The writer gives descriptions of Calamopora fibrosa Goldfuss and Monticulipora dalei Milne-Edwards and Haime, the latter in reality Monticulipora ramosa d'Orbigny.

* **Nicholson, H. Alleyne.** Report upon the Paleontology of the Province of Ontario, Toronto, 1875. 96 pp., 4 pls.

Some thirty-two species of bryozoa are described, only part for the first time, mainly from the Trenton, Hudson River (Cincinnati), Clinton and Niagara formations, referred to the genera Chætetes, Ptilodictya, Retepora, Helopora, Rhinopora, Phænopora, Clathropora, Callopora, Ceramopora; also the new genus Heterodictya with one new species, H. gigantea.

* **Nicholson, H. Alleyne.** Descriptions of species of Hippothoa and Alecto from the Lower Silurian rocks of Ohio, with a description of Aulopora arachnoidea Hall. (Ann. Mag. Nat. Hist., ser. 4, XV, 1875, pp. 123–127, pl. xi.)

Describes from the Cincinnati group of Ohio Hippothoa inflata (Hall), Alecto auloporoides n. sp., frondosa James, confusa n. sp., Aulopora arachnoidea Hall.

* **Nicholson, H. Alleyne.** Descriptions of new species of Polyzoa from the Lower and Upper Silurian rocks of North America. (Ann. Mag. Nat. Hist., ser. 4, XV, 1875, pp. 177–184, pl. xiv.)

Describes from the Cincinnati group Ptilodictya falciformis n. sp., emacerata n. sp., flagellum n. sp., ? arctipora n. sp., fenestelliformis n. sp., Ceramopora ohioensis n. sp., and from the Niagara Fenestella nervata n. sp.

* **Nicholson, H. Alleyne.** Descriptions of new species and of a new genus of Polyzoa from the Paleozoic rocks of North America. (Geol. Mag., new ser., II, 1875, pp. 33–38, pl. ii.)

Describes Heterodictya and H. gigantea, Ptilodictya cosciniformis, Fenestella Davidsoni, Ceramopora Huronensis, Retepora Trentonensis. These are also described in the Report upon the Paleontology of Ontario, 1875.

***Nicholson, H. Alleyne.** On some of the massive forms of Chætetes from the Lower Silurian. (Geol. Mag., new ser., II, 1875, pp. 175–177.)

Describes Chætetes petropolitanus Pander and Chætetes undulatus Nicholson.

***Nicholson, H. Alleyne.** Description of the corals of the Silurian and Devonian systems. (Paleontology of Ohio, II, 1875, pp. 181–242, pls. xxi, xxii.)

This paper contains descriptions of twenty-five species of Chætetes, two of Constellaria and Aulopora arachnoidea Hall.

***Nicholson, H. Alleyne.** Descriptions of Polyzoa from the Silurian formation. (Paleontology of Ohio, II, 1875, pp. 257-268, pl. xxv.)

This article contains the descriptions which appeared earlier in the year in the two papers in the Annals and Magazine of Natural History.

1876.

***Hall, James.** The fauna of the Niagara group in central Indiana. (Twenty-eighth Ann. Rep. New York State Museum Nat. Hist., 1876 (Documentary edition), 32 plates, with explanation sheets.)

The plates only of this article made their appearance in the Documentary edition of the Twenty-eighth Museum Report. The complete edition (Museum edition) did not appear until 1879. The article is devoted to descriptions of a large number of species obtained from the now famous locality on Conns Creek near Waldron, Indiana. Twenty species of bryozoa are described (Museum edition) and figured. They are referred to the genera Chætetes, Trematopora, Callopora, Lichenalia, Sagenella, Ceramopora, Paleschara, Stictopora, Fenestella, Thamniscus.

Hall, James. Paleontology of New York. Illustrations of Devonian fossils.

This work consisted only of plates designed for the Paleontology of New York. It is questionable whether this can be considered a publication, as but a limited number of copies were sent out. Chætetes furcatus, tenuis, humilis, tabulatus, and fruticosus are the new species of bryozoa incompletely figured in this work (pls. xxxvii, xxxviii).

Nicholson, H. Alleyne. On the mode of growth and increase amongst the corals of the Paleozoic period. (Trans. Royal Soc. Edinburgh, XXVII, pp. 237-250, 1876.)

A general discussion involving some monticuliporoid forms.

***Nicholson, H. Alleyne.** Notes on the Paleozoic corals of the State of Ohio. (Ann. Mag. Nat. Hist., ser. 4, XVIII, 1876, pp. 85-94, pl. v.)

This paper marks the opening of a new epoch in the study of Paleozoic bryozoa. For the first time, so far as we are aware, the appearances presented by thin sections viewed under the microscope form the subject of study and illustration. The species whose internal structure is described, and in most cases figured, are Chætetes rhombicus, sigillarioides, nodulosus, rugosus, ramosus, petropolitanus, discoideus, Newberryi, Jamesi, gracilis, Fletcheri, tuberculatus, clathratulus, frondosus, Constellaria antheloidea, Dekayia attrita.

White, C. A. Descriptions of new species of fossils from the Paleozoic rocks of Iowa. (Proc. Acad. Nat. Sci. Philadelphia, 1876, pp. 27-34.)

Describes Chætetes muscatinensis n. sp. and Monticulipora monticula n. sp.

1877.

Miller, S. A. American Paleozoic fossils; a catalogue of the genera and species. Cincinnati, 1877. xv, 246 pp. Supplement 1883, pp. 247-334. Bryozoa, pp. 95-102, 289-294.

* **Nicholson, H. Alleyne, and Etheridge, Robert, Jun.** On Ascodictyon, a new provisional and anomalous genus of Paleozoic fossils. (Ann. Mag. Nat. Hist., ser. 4, XIX, 1877, pp. 463-8, pl. xix.)

The authors characterize very fully the new genus Ascodictyon and describe three species, two from the Hamilton of Ontario and one from the Lower Carboniferous of Scotland, and then discuss at some length the systematic position of the genus.

White, C. A. Report upon the invertebrate fossils collected in portions of Nevada, Utah, Colorado, New Mexico, and Arizona by parties of the expeditions of 1871-1874. (Wheeler's Exploration and Survey west of the 100th Meridian, IV, 1877.) Bryozoa, pp. 99-109, pls. vi, vii.

Describes Rhombopora lepidodendroides Meek, Glauconome nereidis White, Synocladia biserialis Swallow, Polypora stragula White, Monticulipora Dalii Milne-Edwards and Haime (p. 67).

* **James, U. P.** The Paleontologist, Cincinnati, 1878-1883. No. 1, July 2, 1878, pp. 1-8; No. 2, Sept. 14, 1878, pp. 9-16; No. 3, Jan. 15, 1879, pp. 17-24; No. 4, July 10, 1879, pp. 25-32; No. 5, June 10, 1881, pp. 33-44; No. 6, Sept. 12, 1882, pp. 45-56; No. 7, Apr. 16,1883, pp. 57-59, pls. i, ii.

In this small brochure, appearing at irregular intervals, a large number of new species are described, mainly from the Cincinnati group. Some writers have considered that this work should be disregarded on account of its obscure mode of publication. Inasmuch, however, as it has received some recognition, we have deemed it best to recognize the work and regard as valid such of the species as can be identified from the descriptions. The two plates included in the last number are of no value for identifying the species.

Mickleborough, John, and Wetherby, A. G. A classified list of Lower Silurian fossils of the Cincinnati group. (Jour. Cincinnati Soc. Nat. Hist, I, 1878, pp. 61-86.)

Miller, S. A. Description of a new genus and eleven new species of fossils. (Jour. Cincinnati Soc. Nat Hist., I, 1878, pp. 100-108, pl. iii.)

Describes Ptilodictya magnifica n. sp.

Miller, S. A., and Dyer, C. B. Contributions to Paleontology. (Jour. Cincinnati Soc. Nat. Hist., I, 1878, pp. 24-39, pls. i, ii.)

The authors describe Monticulipora calceolus n. sp.

* **Miller, S. A., and Dyer, C. B.** Contributions to Paleontology, No. 2. Cincinnati, 1878. 11 pp., 2 pls. (Published by the authors.)

The authors describe the new bryozoan genus Bythopora, with the type species B. fruticosa n. sp.; also Ptilodictya internodia n. sp., and Intricaria clathrata n. sp.

Ulrich, E. O. Descriptions of some new species of fossils from the Cincinnati group. (Jour. Cincinnati Soc. Nat. Hist., I, 1878, pp. 92-100, pl. iv.)

Describes Callopora cincinnatiensis n. sp., Chætetes venustus n. sp., Ptilodictya perelegans n. sp.

White, C. A. Descriptions of new species of invertebrate fossils from the Carboniferous and Upper Silurian rocks of Illinois and Indiana. (Proc. Acad. Nat. Sci. Philadelphia, 1878, pp. 29–37.)

Describes Ptilodictya triangulata n. sp.

* **Whitfield, R. P.** Preliminary descriptions of new species of fossils from the lower geological formations of Wisconsin. (Annual report of the Geological Survey of Wisconsin for 1877, 1878, pp. 50–89.)

The author describes the following new species, which are afterwards described and figured in Geological Survey Wisconsin, IV, 1882: Trematopora annulifer, granulata, Fenestella granulosa, Fistulipora solidissima, lens, Chætetes fusiformis, Monticulipora rectangularis, punctata, multituberculata, Alveolites irregularis.

1879.

* **Hall, James.** Descriptions of new species of fossils from the Niagara formation at Waldron, Indiana. (Trans. Albany Institute, X, 1883, pp. 57–76.) Extract distributed 1879.

In this paper the author describes fifteen additional new species of bryozoa from the noted Waldron locality. These species have not been illustrated. A few will probably prove synonyms, while some others can not be recognized from the descriptions.

* **Hall, James.** The fauna of the Niagara group in central Indiana. (Twenty-eighth Ann. Rep. New York State Museum Nat. Hist., Museum edition, 1879, pp. 99–203, 32 pls.) Bryozoa, pp. 110–126, pls. v–xii.

* **Nicholson, H. Alleyne.** On the structure and affinities of the "Tabulate Corals" of the Paleozoic period, with critical descriptions of illustrative species. Edinburgh, 1879. 342 pp., 15 pls. Bryozoa, pp. 253–327, pls. xii–xv.

Among the Tabulate Corals the author includes the monticuliporoids and their allies. The following genera of bryozoa are characterized and critically discussed: Monticulipora, Heterotrypa, Dekayia, Constellaria, Fistulipora, Diplotrypa, Monotrypa, Prasopora. One or more typical species of each are described and their internal structure elucidated.

* **Ulrich, E. O.** Descriptions of new genera and species of fossils from the Lower Silurian about Cincinnati. (Jour. Cincinnati Soc. Nat. Hist., II, 1879, pp. 9–30, pl. vii.)

Two new genera, Rhopalonaria and Crateripora, and five new species are described, Rhopalonaria venosa, Chætetes compressus, Fistulipora flabellata, Crateripora lineata and var. expansa, Crateripora erecta.

* **Ulrich, E. O.** Description of a new genus and some new species of Bryozoans from the Cincinnati group. (Jour. Cincinnati Soc. Nat. Hist., II, 1879, pp. 119–131, pl. xii.)

Describes the new genus Atactopora with seven new species, A. hirsuta, maculata, multigranosa, mundula, tenella, subramosa, septosa; also Stellipora limitaris and Chætetes granuliferus, irregularis, subglobosus, elegans.

Walcott, C. D. Fossils of the Utica slate. (Trans. Albany Institute, X, 1883, pp. 18–38.) Extract distributed 1879.

Describes Sagenella ambigua n. sp. from the Utica slate.

White, C. A. Paleontological Papers No. 11: Remarks upon certain Carboniferous fossils from Colorado, Arizona, Idaho, Utah, Wyoming, and certain Cretaceous corals from Colorado, together with descriptions of new forms. (Bulletin U. S. Geological Survey, V, 1879, pp. 209–221.)

This paper contains a description of Ptilodictya triangulata White.

1880.

***Hall, James.** Corals and Bryozoans of the Lower Helderberg group. (Thirty-second Ann. Rep. New York State Museum Nat Hist., Albany, 1879, pp. 141–176, pls. vii–xxii.)

This work is a continuation of the work on the bryozoan fauna of the Lower Helderberg group published in 1874. Seventy-four species are described and figured, most of them new, referred to the genera Chætetes, Trematopora, Callopora, Lichenalia, Ceramopora, Paleschara, Stictopora, Escharopora, Fenestella, Ichthyorachis, and Thamniscus.

Miller, S. A. Description of four new species of Silurian fossils. (Jour. Cincinnati Soc. Nat. Hist., III, 1880, pp. 140–144, pl. iv.)

Describes Bythopora nashvillensis n. sp.

Ulrich, E. O. Catalogue of fossils occurring in the Cincinnati group of Ohio, Indiana, and Kentucky. Cincinnati, 1880. iv, 31 pp.

Whitfield, R. P. Descriptions of new species of fossils from the Paleozoic formations of Wisconsin. (Ann. Rep. Wisconsin Geological Survey for 1879, 1880, pp. 45–71.)

Contains description of one new species of bryozoa, Fistulipora rugosa.

1881.

Claypole, E. W. On the occurrence of an archimediform Fenestellid in the Upper Silurian rocks of Ohio. (Proceedings of the American Association for the Advancement of Science, XXX, 1881, p. 191.)

The author notes the occurrence of this remarkable form for which he proposes the new genus and species Helicopora latispiralis.

***Hall, James.** Bryozoans of the Upper Helderberg and Hamilton groups. (Trans. Albany Institute, X, 1883, pp. 145–197.) Distributed in the form of extracts separately paged in 1881.

This paper contains brief, usually inadequate descriptions, without illustrations, of 189 new species from the Upper Helderberg of New York and Ontario, and from the Falls of the Ohio, which deposit Hall considered of Upper Helderberg age, and from the Hamilton group of New York, Ontario, and elsewhere. Most of these species were later more fully described and figured in the Paleontology of New York, VI, 1887. The new genera and subgenera proposed are Phractopora, Thallostigma, Intrapora, Thamnopora, Prismopora, Scalaripora, Cystopora, Clonopora, Pteropora, Semiopora, Acrogenia, Hederella, Ptilionella, and Hernodia.

Miller, S. A. Subcarboniferous fossils from the Lake Valley mining district of New Mexico, with descriptions of new species. (Jour. Cincinnati Soc. Nat. Hist., IV, 1881, pp. 306–315, pl. vii.)

Describes Trematopora americana n. sp.

* **Nicholson, H. Alleyne.** On the structure and affinities of the genus Monticulipora and its subgenera, with critical descriptions of illustrative species. Edinburgh, 1881. 240 pp., 6 pls. A review of this work appeared in the Ann. Mag. Nat. Hist., ser. 5, VIII, 1881, pp. 61–63.

This memoir is an expansion of the latter part of the author's work "On the Structure and Affinities of the Paleozoic Tabulate Corals." After chapters on the General History of the Genus Monticulipora, Its General and Comparative Structure, Development, Affinities and Zoological Position, Relations to Other Genera and Subdivisions, full and careful descriptions are given of the genera and subgenera (as the author calls some of them) Fistulipora, Constellaria, Dekayia, Monticulipora, Diplotrypa, Monotrypa, Prasopora, Peronopora, Heterotrypa, with illustrative species fully and accurately described and amply figured. This memoir marks a very great advance over any previous work.

Quenstedt, Friedrich Augustus. Die Roehren- und Sternkorallen. (Petrefactenkunde Deutschlands, VI.) Leipzig, 1881. Plates in Atlas.

In this work, a general review of corals and some bryozoa, are references with more or less extended descriptive remarks to a number of American species, accompanied by very good figures in the atlas. Chætetes frondosus var. limatus, Chætetes leviramus, and Fenestella incongruens are new names proposed for American forms. The first and third are inadequately described; the second is a synonym for Bythopora gracilis (Nicholson).

1882.

Buel, Ira M. The corals of Delafield. (Transactions of the Wisconsin Academy of Science, V, 1882, pp. 185–193.)

The paper is a general discussion more particularly of the monticuliporoid forms occurring at this noted locality and described in the Geology of Wisconsin, IV.

* **Hall, James.** Descriptions of species of fossils found in the Niagara group at Waldron, Indiana. (Indiana, Department of Geology and Nat. Hist., Eleventh Ann. Rep., 1882, pp. 217–345, pls. iv–xi.)

This is a reproduction for the benefit of Indiana readers of Hall's papers on the Waldron fossils, which appeared in the Twenty-eighth Ann. Rep. New York State Museum, 1876–1879, and the Trans. Albany Institute, X, Extract, 1879.

* **Miller, S. A.** Notice of a work by Prof. Nicholson on the Genus Monticulipora. (Jour. Cincinnati Soc. Nat. Hist., V, 1882, pp. 25–33.)

An iconoclastic review of Prof. Nicholson's "Genus Monticulipora."

Miller, S. A. Description of two new genera and eight new species of fossils from the Hudson River group, with remarks upon others. (Jour. Cincinnati Soc. Nat. Hist., V, 1882, pp. 34–44, pls. i, ii.)

Describes Stomatopora proutana n. sp.

* **Ulrich, E. O.** American Paleozoic bryozoa. (Jour. Cincinnati Soc. Nat. Hist., V, 1882, pp. 121–175, pls. vi–viii, pp. 232–257, pls. x, xi; VI, 1883, pp. 82–92, pl. i, pp. 148–168, pls. vi, vii, pp. 245–279, pls. xii–xiv; VII, 1884, pp. 24–51, pls. i–iii.)

This is the first attempt at a comprehensive account of the bryozoa found in American Paleozoic strata. After a general discussion regarding the affinities and systematic position of some groups of bryozoa (Trepostomata), whose systematic position had been a bone of contention for many years, the author gives brief diagnoses of most of the Paleozoic genera hitherto known and proposes the new genera Eridopora, Leioclema, Scenellopora, Mitoclema, Arthronema, Graptodictya, Arthropora, Dicranopora, Stictoporella, Rhinidictya, Cystodictya, Pachydictya, Phyllodictya, Amplexopora, Batostomella, Calloporella, Aspidopora, Dekayella, Petigopora, Discotrypa, Spatiopora, Didymopora, Ceramoporella, Cheiloporella, Crepipora. Then are described a large number of new species (81). The descriptions are full and accurate; comparisons with related species and often critical notes are given. A new suborder, the Trepostomata, is founded.

White, C. A. Van Cleve's fossil corals. (Indiana, Department of Geology and Nat. Hist., Eleventh Ann. Rep., 1882, pp. 376–401, pls. xliv–lv.)

Contains descriptions of Constellaria antheloidea Hall, Monticulipora frondosa d'Orbigny, and Clathropora frondosa Hall.

* **Whitfield, R. P.** Paleontology. (Geology of Wisconsin, IV, 1882, pp. 163–349, pls. i–xxvii.)

Contains descriptions of the following species: Chætetes fusiformis, Monticulipora rectangularis, punctata, multituberculata, ? Ortoni, Alveolites irregularis, Fenestella granulosa, Stictopora fragilis, Trematopora granulata, annulifera, Fistulipora solidissima, rugosa, lens, Constellaria polystomella.

Whitfield, R. P. Descriptions of new species of fossils from Ohio. (Annals New York Acad. Sci., II, 1882, pp. 193–244.)

Describes Synocladia rectistyla.

1883.

* **Claypole, E. W.** On Helicopora, a new spiral genus (with three species) of North American Fenestellids. (Quar. Jour. Geol. Soc. London, XXXIX, 1883, pp. 30–38, pl. iv.)

Gives a description of Helicopora n. gen. with three new species—H. latispiralis, Ulrichii, and archimediformis, and a brief discussion of the family Fenestellidæ, to which the new genus is referred by the author.

* **Foord, A. H.** Contributions to the micro-paleontology of the Cambro-Silurian rocks of Canada. (Geol. Nat. Hist. Survey Canada, Ottawa, 1883. 26 pp., 7 pls.)

The writer gives a good account of monticuliporoids from Ordovician strata of Canada. The species were studied according to modern methods and the details of internal structure are well described and figured. The new species are Monticulipora Westoni, Billingsi, Homotrypa similis, Prasopora oculata, affinis, Diplotrypa regularis, Amplexopora superba, Canadensis, Batostoma Ottawaense, Spatiopora areolata.

Hall, James. Van Cleve's fossil corals. (Indiana, Department Geology and Nat. Hist., Twelfth Ann. Rep., 1883, pp. 239–270, pls. i–xiv.)

In this volume are reproduced a number of plates of western fossils, drawn and engraved by John W. Van Cleve previous to 1853. The publication of the work was prevented by the author's death. The bryozoa, derived from the Cincinnati and Clinton groups, are identified by Professor Hall. The new species are Ptilodictya bipunctata, Stictopora compressa, bifurcata, and Van Clevii.

* **Hall, James.** Discussion upon the manner of growth, variation of form, and characters of the genus Fenestella, and its relations to Hemitrypa, Polypora, Retepora, Cryptopora, etc. (Report of the State Geologist of New York for the year 1882, Albany, 1883, pp. 5–16, 36 figs.)

Contains a discussion of Fenestella and related genera, and 25 plates prepared for, and later appearing in, Paleontology of New York, VI, 1887.

* **Hall, James.** Fossil corals and bryozoans of the Upper Helderberg group. 25 plates with explanation sheets. (Report of the State Geologist of New York for the year 1882, Albany, 1883, pls. vii–xxxiii.)

James, U. P. Descriptions of fossils from the Cincinnati group. (Jour. Cincinnati Soc. Nat. Hist., VI, 1883, pp. 235–236, pl. x.)

Contains description of Monticulipora dychei n. sp.

White, C. A. Contributions to invertebrate paleontology, No. 6: certain Carboniferous fossils from the Western States and Territories. (Hayden's Twelfth Ann. Rep. U. S. Geogr. Geol. Surv. of the Territories, Part I, 1883, pp. 119–141, pls. xxxiii–xxxvi.)

Contains description and figures of Ptilodictya triangulata.

1884.

* **Foord, Arthur H.** On three new species of Monticuliporoid Corals. (Ann. Mag. Nat. Hist., ser. 5, XIII, 1884, pp. 338–342, pl. xii.)

Describes Monotrypa macropora and Amplexopora microtoma from the Wenlock of England, and Dekayella robusta from Cincinnati, Ohio.

* **Hall, James.** Descriptions of the Bryozoans of the Hamilton group. (Report of the State Geologist of New York for the year 1883, Albany, 1884, pp. 5–61.)

Contains descriptions of 74 species of bryozoa, all of which afterwards reappeared in Paleontology of New York, VI, 1887.

* **Hall, James.** Bryozoa (Fenestellidæ) of the Hamilton group. (Thirty-sixth Ann. Rep. New York State Museum Nat. Hist., Albany, 1883, pp. 57–72.)

Contains descriptions of 20 species of Fenestella, which afterwards reappeared in Paleontology of New York, VI, 1887.

* **James, U. P.** Descriptions of three species of fossils. (Jour. Cincinnati Soc. Nat. Hist., VII, 1884, pp. 21–24.)

Describes Fistulipora oweni sp. nov. and Ceramopora ? beani James, both species illustrated with woodcuts.

* **James, U. P.** Descriptions of four new species of fossils from the Cincinnati group. (Jour. Cincinnati Soc. Nat. Hist., VII, 1884, pp. 137–139, pl. vii.)

Describes Monticulipora ohioensis n. sp. and falesi n. sp.

Ringueberg, Eugene N. S. New fossils from the four groups of the Niagara period of western New York. (Proc. Acad. Nat. Sci. Philadelphia, 1884, pp. 144–150, pls. ii, iii.)

Describes Stictopora obliqua n. sp. and graminifolia n. sp. Descriptions and figures are both worthless.

Spencer, J. W. Niagara fossils. Part III. Fifteen new species of Niagara fossils. (Trans. St. Louis Acad. Sci., IV, 1884, pp. 602–610, pls. vii–ix.) Also in (Bulletin of the Museum of the University of the State of Missouri, I, No. 1, 1884, pp. 52–61, pls. vii–ix).

Describes Rhinopora venosa n. sp., Clathropora? gracilis n. sp., Fenestella bicornis n. sp., Polypora (Fenestella?) Albionensis n. sp. The fossils themselves are very poorly preserved, the descriptions given are inadequate, and the illustrations are almost worthless. It is doubtful if any can be recognized. The first two are almost certainly synonyms for other species.

1885.

Davis, William J. Kentucky fossil Corals. Part II, 1885. (Kentucky Geological Survey, John R. Proctor, director.) 139 pls., no text.

Of this work only the plates have appeared. In the explanation sheets of plates 51, 73, 78, and 80 occurs a new generic term, Nicholsonia, with three species—canadensis (= Hederella canadensis (Nicholson)), adnata, and angulata. The last is not a bryozoan nor even a fossil, while the second, though too poorly figured to be determined with certainty, is probably the same as Hederalla filiformis (Billings).

***Hall, James.** On the mode of growth and relations of the Fenestellidæ. (Report of the State Geologist of New York for the year 1884, Albany, 1885, pp. 35–46, pls. i, ii.)

The author defines various genera referred to the Fenestellidæ and gives two plates to illustrate generic structure. The work was in large part later incorporated in the Paleontology of New York, VI, 1887. New genera, mostly called subgenera by the author, are Fenestrellina [d'Orbigny?], Fenestropora, Ptyloporina, Ptyloporella, Unitrypa, Isotrypa.

***Nicholson, H. Alleyne, and Foord, Arthur H.** On the genus Fistulipora M'Coy, with descriptions of several species. (Ann. Mag. Nat. Hist., ser. 5, XVI, 1885, pp. 496–517, pls. xv–xviii.)

An admirable study of the genus Fistulipora and a number of its species. The structure of a number of previously recorded species is well worked out and the following new species fully described: Fistulipora muscosa (Lower Carboniferous—Scotland), nummilina (Wenlock—England), dobunica (Wenlock—England), cornavica (Wenlock—England). American species described are F. utriculus Rominger, eriensis Rominger.

1886.

***Hall, James.** Bryozoa of the Upper Helderberg group. Plates and explanations. (Fifth Ann. Rep. State Geologist, New York, for the year 1885, Albany, 1886, 14 pls.) Twelve plates bound in quarto form were sent out in 1886 under the above title in brochure form.

These plates appeared subsequently in the Paleontology of New York, VI, 1887.

Ringueberg, Eugene N. S. New genera and species of fossils from the Niagara shales. (Bulletin Buffalo Soc. Nat. Sci., V, 1886, pp. 5–22, pls. i, ii.)

Describes the following new species: Ceramopora orbiculata, Rhinopora curvata, Stomatopora recta, parva, Chætetes expansus. The illustrations are very poor.

***Ulrich, E. O.** Descriptions of new Silurian and Devonian fossils. (Contributions to American Paleontology, Volume I, No. 1, Cincinnati, 1886, pp. 3–35, pls. i–iii.) Bryozoa, pp. 3–25, pls. i, ii.

This publication, designed as a serial, ended with its first number. The author discusses critically the families Fenestellidæ and Acanthocladiidæ and diagnoses their genera. Two new genera are defined, Buskopora and Lichenotrypa, and sixteen new species from the Falls of the Ohio, referred to the genera Fenestellà, Semicoscinium, Unitrypa, Polypora, Fistulipora, Eridopora, Buskopora, Lichenotrypa, and Discotrypa.

***Ulrich, E. O.** Report on the Lower Silurian Bryozoa, with preliminary descriptions of some of the new species. (Fourteenth Ann. Rep. Geol. Nat. Hist. Sur. Minnesota, 1886, pp. 57–103.)

One new genus is established, Homotrypella, and 37 new species described from the Trenton strata of Minnesota, which are later fully described and figured in Geology of Minnesota, III.

1887.

***Foerste, August F.** Flint Ridge Bryozoa. (Bulletin of the Scientific Laboratories of the Denison University, II, 1887, pp. 71–88, pl. vii.)

This paper, following the lines of work laid down by Mr. Ulrich, deals fairly well with the Coal Measures fauna of Flint Ridge in central Ohio. One new genus, Chainodictyon, is proposed, and the following new species are described: Rhombopora multipora, Glauconome whitii, Chainodictyon laxum, Fenestella limbatus and var. remotus, Stenopora Ohioensis.

***Foerste, August F.** The Clinton group of Ohio, Part III. (Bulletin of the Scientific Laboratories of the Denison University, II, 1887, pp. 149–176, pls. xv–xvii.) [The plates were, however, omitted from this volume, but pls. xv and xvi appear in the succeeding volume, III, 1888.]

This paper contains the best account which has yet appeared of the bryozoan fauna of the Clinton group in Ohio. The new species are Hemitrypa ulrichi, Pachydictya emaciata, bifurcata-instabilis, turgida, obesa, Prasopora parmula, Monotrypella confluens, Callopora magnopora, Ohioensis.

***Foerste, August F.** Recent methods in the study of the Bryozoa. (Science, X, 1887, pp. 225–226.) Also, Sections of fossils. (Science, XI, 1888, p. 22.)

These two articles, written in reply to earlier communications in Science by Joseph F. James decrying the newer methods of investigating Paleozoic bryozoa, set forth admirably the spirit and method of modern studies on the Paleozoic bryozoa.

***Hall, James.** Descriptions of Fenestellidæ of the Hamilton group of New York. (Sixth Ann. Rep. State Geologist New York for the year 1886, Albany, 1887, pp. 43–70, pls. i–vii.)

Contains descriptions of twenty-two species of Fenestella, of which four are called n. sp., from the Hamilton group, illustrated by thirteen plates, of which seven appear in this report and the remainder in the Forty-first Ann. Rep. New York State Museum Nat. Hist., 1888.

* **Hall, James**, and **Simpson, George B.** Paleontology of New York, VI, Corals and Bryozoa: Text and plates containing descriptions and figures of species from the Lower Helderberg, Upper Helderberg and Hamilton groups. Albany, 1887. xxvi, 298 pp., 67 pls.

It is to be regretted that this, the most important work of the New York Survey upon the bryozoa, should prove on critical examination to be of so little value either to the systematist or to the practical paleontologist. As Hall acknowledges that the work was practically done by the draftsman, Mr. George B. Simpson, the merits and demerits of the volume may be properly charged to the latter. The drawings, however beautiful, are diagrammatic to an extreme and are of little assistance to the student. The descriptions are in many cases vague, and often differ so decidedly from previous descriptions of the same form that no reliance can be placed upon them. The great number of forms distinguished is confusing. Synonyms, we believe, abound. (See note under Lioclema minutum in the Catalogue of Genera and Species. The bryozoa of New York still require study.

Brief generic diagnoses of the genera and subgenera used, 60 in number, are given in the preliminary pages, prepared by Mr. Charles E. Beecher. Descriptions follow of 83 species and 3 named varieties from the Lower Helderberg, 153 species and 6 named varieties from the Upper Helderberg (a large number of these are from the Falls of the Ohio and are now considered by Ulrich of Hamilton age), and 113 species from the Hamilton. A few species (one from the Niagara) have crept into the plates without description.

* **James, U. P.**, and **James, Joseph F.** On the Monticuliporoid corals of the Cincinnati group, with a critical revision of the species. (Jour. Cincinnati Soc. Nat. Hist., X, 1887, pp. 118–141; X, 1888, pp. 158–184; XI, 1888, pp. 15–47.

The title is sufficiently explanatory of these papers, which are iconoclastic in spirit and decry modern methods of research. A few species described by Mr. U. P. James are wretchedly illustrated.

Rominger, Carl. Description of a new form of Bryozoa. (Proc. Acad. Nat. Sci. Philadelphia, 1887, p. 11, pl. i.)

Gives a description of the exterior appearance of three specimens of a new bryozoan discovered in Corniferous drift bowlders of Michigan for which the new generic and specific name Patellipora stellata is proposed.

1888.

Foerste, August F. Notes on Paleozoic fossils. (Bulletin Scientific Laboratories Denison University, III, 1888, pp. 117–136, pl. xiii.)

This paper contains an additional note on Chainodictyon laxum.

* **Hall, James.** Description of new species of Fenestellidæ of the Lower Helderberg, with explanations of plates illustrating species of the Hamilton group, described in the report of the State Geologist for 1886. (Report of State Geologist of New York for the year 1887, pp. [393–4], pls. viii–xv.) This report is bound with the Forty-first Ann. Rep. New York State Museum Nat. Hist., 1888.

Contains descriptions of Fenestella (Tectulipora nov. subgen.) loculata n. sp. and Fenestella frequens, and eight plates, the first six illustrating species of Fenestella described the preceding year in the Sixth Ann. Rep. State Geologist of New York.

The last two illustrate species of Fenestella, Fistulipora, and Lichenalia described but not figured in Paleontology of New York, VI, 1887.

Herrick, C. L. Geology of Licking County. (Bulletin Denison University, IV, 1888, pp. 11–60, pl. x.)

On the plate the author figures Fenestella albida? and Pinnatopora intermdia Ulrich.

James, Joseph F. Monticulipora, a coral and not a polyzoon. (American Geologist, I, 1888, pp. 386–392.)

Keyes, C. R. On the fauna of the Lower Coal Measures of central Iowa. (Proc. Acad. Nat. Sci. Philadelphia, 1888, pp. 222–246, pl. xii.)

Gives descriptions of Rhombopora lepidodendroides Meek, and Synocladia biserialis Swallow.

* **Ulrich, E. O.** On Sceptropora, a new genus of Bryozoa, with remarks on Helopora, Hall, and other genera of that type. (American Geologist, I, 1888, pp. 228–234.)

In this paper the genera Sceptropora (nov. gen.), Helopora Hall, Arthroclema Billings, and Arthrostylus (proposed for Arthronema, found to be preoccupied) are described and the new species Sceptropora facula and Helopora lindstromi from Gotland.

* **Ulrich, E. O.** A list of the Bryozoa of the Waverly group in Ohio; with descriptions of new species. (Bulletin Denison University, IV, 1888, pp. 62–96, pls. xiii, xiv.)

The paper includes the descriptions of five new and three other species of Fenestella, one new species of Polypora, five new species of Pinnatopora, one new species of Tæniodictya, three of Cystodictya, seven of Streblotrypa, one of Rhombopora.

1889.

Foerste, August F. Notes on Clinton group fossils, with special reference to collections from Indiana, Tennessee, and Georgia. (Proc. Boston Soc. Nat. Hist., XXIV, 1889, pp. 263–355, pls. v–ix.)

The author gives notes on additional species from the Clinton group. Three new species and one new variety of bryozoa are described: Ptilodictya expansa-emarcescens, farctus, famelicus, rudis.

* **Miller, S. A.** North American Geology and Paleontology. Cincinnati, 1889. 664 pp., 1194 figs. in text. Bryozoa, pp. 289–330, figs. 448–531. First Appendix, 1892, pp. 665–718, figs. 1195–1265. Bryozoa, pp. 684–685. Second Appendix, 1897, pp. 719–793. Bryozoa, pp. 755–758.

This ambitious work, a catalogue of the genera and species of North American Paleozoic fossils, the genera diagnosed, must be used with caution. Many of the bryozoa are found classed among the Cœlenterata, and the Bryozoa section is badly mixed.

Nettleroth, Henry. Kentucky fossil shells, 1889. (Kentucky Geological Survey, John R. Procter, Director.) 245 pp., 36 pls.

Descriptions are included in this work of Ptilodictya and Ptilodictya hilli James.

***Ulrich, E. O.** Contributions to the micro-paleontology of the Cambro-Silurian rocks of Canada. Part II. Geol. Nat. Hist. Sur. Canada, Montreal, 1889, pp. 27-57, pls. viii, ix.)

The paper contains an account with descriptions of the bryozoa collected from Stony Mountain, Manitoba. One new genus is created, Goniotrypa, and a number of new species.

1890.

***Nickles, J. M.** Studies on Monticulipora. (American Geologist, VI, 1890, pp. 396-399.)

A rejoinder to Rominger's Studies on Monticulipora, American Geologist, VI, 1890, pp. 102-121.

*** Rominger, Carl.** Studies on Monticulipora. (American Geologist, VI, 1890, pp. 102-121.)

A paper general and critical in nature, and taking strong ground against modern methods of determination.

*** Ulrich, E. O.** New Silurian Bryozoa. (Jour. Cincinnati Soc. Nat. Hist., XII, 1890, pp. 173-198, 22 figs. in text.)

Describes the new genera, Vinella and Diastoporina, and new species bolonging to the genera Vinella, Stomatopora, Mitoclema, Diastoporina, Phylloporina, Rhinidictya, Pachydictya, Stictoporella, Arthrostylus, Helopora, Arthroclema, Nematopora. These afterwards appeared in the Geology of Minnesota, III, 1893.

*** Ulrich, E. O.** Paleozoic Bryozoa. (Geological Survey of Illinois, VIII, 1890, pp. 285-688, pls. xxix-lxxviii.)

The publication of this most important memoir marks an epoch in the study of the Paleozoic Bryozoa. Based upon an elaborate series of investigations embracing a very large number of Paleozoic species and a vast amount of material, a classification is proposed laid down along lines which are not likely soon to be disturbed. The "Introduction and terminology" is followed by chapters on the "General and comparative structure of Paleozoic Bryozoa" and the "Classification and interrelations of families and genera." The definitions of suborders, families, and genera are carefully drawn, some 310 species, many of them new, described and figured. This work is indispensable to the student of Paleozoic Bryozoa.

1891.

*** Hall, James.** Continuation of descriptions of Bryozoa not printed in Volume VI, Paleontology of New York, for the Report of the State Geologist, 1890. (Tenth Annual Report of the State Geologist of New York for the Year 1890, Albany, 1891, pp. 37-57. Also in Forty-fourth Annual Report of the New York State Museum, 1891, pp. 67-87.)

Contains descriptions of Hamilton group bryozoa, for which there was not room in Paleontology of New York, VI. There are described: Paleschara, five species; Stictopora, nineteen species; Semiopora, one species; Prismopora, two species; Ptilodictya, two species; Thamniscus, one species; Hederella, one species; Ptilopora, two species. There are no illustrations.

Whiteaves, J. F. Contributions to Canadian Paleontology, Volume I, Part III. The fossils of the Devonian rocks of the Mackenzie River Basin. (Geol. Nat. Hist. Sur. Canada, 1891, pp. 197–253, pls. xxvii–xxxii.)

Contains the following new species: Proboscina laxa, Stomatopora moniliformis, Monotrypella Unjiga.

1892.

Ami, Henry M. Notes and descriptions of some new or hitherto unrecorded species of fossils from the Cambro-Silurian (Ordovician) Rocks of the Province of Quebec. (Canadian Record of Science, V, 1892, pp. 96–103.)

Contains descriptions of Dicranopora parva, n. sp.; Prasopora lycoperdon Vanuxem, var. Selwyni, n. var.; Diplotrypa Quebecensis, n. sp.; Monotrypa incerta, n. sp. It is doubtful whether any of these, except Diplotrypa Quebecensis, which has since been redescribed and figured by Ulrich, will gain recognition.

Rominger, Carl. On the occurrence of typical Chætetes in the Devonian strata at the Falls of the Ohio, and likewise in the analogous beds of the Eifel in Germany. (American Geologist, X, 1892, pp. 56–63, pl. iii.)

A general discussion with figures and some description of Monotrypa tenuis Hall, Chætetes ponderosus Rominger, and two species not bryozoans.

1893.

Cole, Grenville, A. J. On Hemitrypa hibernica McCoy. (Scientific Proceedings of the Royal Dublin Society, (n. s.) VIII, 1893, pp. 132–144, pl. viii.)

The author gives an admirable account of the history of the genus Hemitrypa, whose structure he apprehends correctly. The article contains numerous references to American work and American species.

***James, Joseph F.** Manual of the paleontology of the Cincinnati group. (Jour. Cincinnati Soc. Nat. Hist. 1893–1896. Part IV in Vol. XV, 1893, pp. 144–159; Part V in Vol. XVI, 1894, pp. 178–208; [Part VI] in Vol. XVIII, 1895, pp. 67–88; [Part VII] in Vol. XVIII, 1896, pp. 115–140.)

Descriptions are given of the species of monticuliporoids of the Cincinnati group which the author considered valid, and those which he considered synonyms are referred to the species of which he considered them synonyms. The work, which is rather iconoclastic, was left unfinished by the death of the author.

***Ulrich, E. O.** On Lower Silurian Bryozoa of Minnesota (Geology of Minnesota, III, Part I, Minneapolis, 1893, pp. 96–332, pls. i–xxviii.)

Next to the memoir in the Geological Survey of Illinois, VIII, 1890, this is the most important work on the Paleozoic Bryozoa, even though it deals mainly with the Trenton of Minnesota. The classification given in the Illinois work is improved in some particulars. The descriptive part contains 157 species, many of them new, referred to 50 genera.

1894.

***Keyes, Charles Rollin.** Missouri Geological Survey, V, Paleontology of Missouri, Part II, Jefferson City, 1894. 226 pp., 24 pls. Bryozoa, pp. 13–37, pls. xxxiii, xxxiv.

Catalogues with synonymy and localities the species of bryozoa found in the State of Missouri or near its boundaries. Some species are described and figured, the descriptions and figures being mostly reproductions from the Geological Survey of Illinois, VIII, 1890.

1895.

Ami, H. M. Notes on Canadian fossil bryozoa. (Canadian Record of Science, VI, 1895, pp. 222–229.)

Notes the Canadian forms described by E. O. Ulrich in the Geology of Minnesota, III.

Foerste, August F. Fossils of the Clinton group in Ohio and Indiana. (Geol. Sur. Ohio, VII, 1895, pp. 516–601, pls. xxviii–xxxviiA.)

In this work there is reproduced with more or less fullness, for the benefit of Ohio readers, what Mr. Foerste had published regarding the Clinton group in Ohio in previous papers.

Herrick, C. L. Observations upon the so-called Waverly group of Ohio. (Geol. Sur. Ohio, VII, 1895, pp. 495–515, pl. xix, 9.)

Rhombopora ohioensis Ulrich is figured on pl. xix.

* **Simpson, George B.** A discussion of the different genera of Fenestellidæ. (Thirteenth Ann. Rep. State Geologist New York for the year 1893, Albany, 1894 [distributed 1895], pp. 687–727; also in Forty-seventh Ann. Rep. New York State Museum Nat. Hist., 1894, pp. 881–921.)

A general discussion of the Fenestellidæ and inter-relations of the genera. The author reproduces original figures by Prout and King of species of Semicoscinium, Fenestralia, Phyllopora, Synocladia. The following new generic names appear: Flabelliporina, Polyporella, Flabelliporella, Reteporella, Pinnaporina, Pinnaporella, Cycloporina, Tectuliporella, Lyroporina, Lyroporella.

Whiteaves, J. F. Systematic list, with references, of the fossils of the Hudson River or Cincinnati formation at Stony Mountain, Manitoba. (Paleozoic Fossils, III, Part II, 1895, pp. 111–128. Geol. Sur. Canada.)

The paper contains no descriptions, but synonymy and localities are given.

Whitfield, R. P. Contributions to the paleontology of Ohio. (Geol. Sur. Ohio, VII, 1895, pp. 407–494, pls. i-xii.)

Contains a description of Synocladia rectistyla.

1896.

Harper, George W., and **Bassler, R. S.** Catalogue of the fossils of the Trenton and Cincinnati periods, occurring in the vicinity of Cincinnati, Ohio. Cincinnati, 1896. 34 pp.

A list of fossils, including bryozoa, showing their vertical range.

Smith, James Perrin. Marine fossils from the Coal Measures of Arkansas. (Proc. American Phil. Soc., XXXV, 1896, pp. 213–285, pls. xvi–xxiv.)

Records the occurrence of several Coal Measures bryozoa at Poteau Mountain, Indian Territory, and in northeastern Arkansas.

* **Ulrich, E. O.** Bryozoa. (Zittel's Text-book of Paleontology (English edition). Translated and edited by Charles R. Eastman. Vol. I, Part I.) Bryozoa, pp. 257–291, figs. 411–488.

This work gives a comprehensive survey and classification of all the bryozoa. Five suborders are recognized: Ctenostomata, Cyclostomata, Cryptostomata, Trepostomata, and Chilostomata. One new genus is defined, Cyclotrypa.

1897.

* **Simpson, George B.**

A handbook of the genera of the North American Paleozoic Bryozoa. With an introduction upon the structure of living species. (Fourteenth Ann. Rep. State Geologist New York for the year 1894, Albany, 1895 [distributed 1897], pp. 407–608, pls. A–E, i–xxv.) This report of the State Geologist also appears as part of the Forty-eighth Annual Report of the New York State Museum.

To give a critical review of this work would require a volume in itself. The "Historical introduction," "Bibliography of recent forms," and the account of the structure of the polypide, or living animal, are valuable, bringing together, as they do, much useful knowledge. The list of North American species is but a condensation from Miller's North American Geology and Paleontology, without an attempt even to refer any of the species to the new genera described in succeeding pages of the Handbook. The "Descriptions of Families and Genera" forms the most disappointing part of the work. Many new, and generally needless, family names are proposed. As one of numerous similar examples, we may mention that the family Monticuliporidæ is defined as embracing forms with cystiphragms and no interstitial cells, and then a new family, Prasoporidæ, is proposed for forms having cystiphragms and interstitial cells. But the genus Monticulipora often has interstitial cells, and, moreover, Simpson figures it so. Many of the genera proposed are very artificial and in at least one instance imaginary (see remark under Lyropora in the Catalogue following). Diagnoses of genera by other authors are in some cases put in quotation marks, but are entirely misquoted; misspellings of generic and specific names are frequent; a number of important genera are omitted, whether designedly or not is not stated; sometimes reproductions of figures of other authors, and also of Hall and Simpson, are given under different names; some specific names, which are found nowhere else, are given without explanation or definition.

The new generic names found in this handbook are Lyroporidra, Anastomopora, Thamnocella, Stictocella, Stictoporidra (page 527; called Stictoporina by error on page 532), Fistuliporina, Fistuliporella, Ptilocella, Fistuliporidra, Fistulicella.

Whiteaves, J. F. The fossils of the Galena-Trenton and Black River formations of Lake Winnepeg and its vicinity. (Paleozoic Fossils, III, Part II, 1897, pp. 129–242, pls. xvi–xxii.) Bryozoa, pp. 161–163, pls. xviii, xix (in part).

The new species are Stomatopora Canadensis, Mesotrypa Selkirkensis.

1898.

Whiteaves, J. F. On some additional or imperfectly understood fossils from the Hamilton formation of Ontario, with a revised list of the species therefrom. (Contributions to Canadian Paleontology, I, Part V, 1898, pp. 361–418, pls. xlviii–l. Geol. Surv. Canada.) Bryozoa, pp. 376–382, pl. xlviii (in part).

One new species is described, Scalaripora Canadensis.

1899.

Grabau, Amadeus W. Geology and Paleontology of Eighteen-Mile Creek and the Lake Shore Sections of Erie County, New York. Part II. Paleontology. (Bulletin of the Buffalo Society of Natural Sciences, VI, 1899, pp. 98–403, 263 figs.) Bryozoa, pp. 136–139, 158–179, figs. 47–77A.

In the fauna of this region the author enumerates, giving brief descriptions copied or adapted from Hall and Simpson's Paleontology of New York, VI, or Simpson's Handbook of Genera, some forty species of bryozoa. Diagnoses are also given of the genera used. One new species appears, Monotrypa amplectens.

1900.

Grabau, Amadeus W. The faunas of the Hamilton group of Eighteen-Mile Creek and vicinity, in western New York. (Sixteenth Annual Report of the State Geologist of New York for the year 1896, New York and Albany, 1899, [issued April, 1900], pp. 227–335.)

In the fauna is noted the occurrence of seven species of bryozoa. In a later work, but appearing earlier (see under 1899), the author gives a full account of the bryozoan fauna.

Rogers, Austin F. New Bryozoans from the coal measures of Kansas and Missouri. (Kansas University Quarterly, ser. A, IX, No. 1, January, 1900, 12 pp., pls. i–iv.)

This paper came to hand too late to be incorporated into our work at any point but this. It contains good descriptions and figures of the following species, all new: Stenopora spinulosa, spissa, Cystodictya inequimarginata, divisa, Streblotrypa ulrichi, striatopora, Fenestella hexagonalis, dentata, kansasensis, ovatipora, missouriensis, Polypora aspera, flexuosa, elliptica, triangularis, Thamniscus tenuiramus, Pinnatopora pyriformipora, ptiloporoidea, multipora, Septopora interporata, Acanthocladia pinnata, Rhombocladia delicata.

Rhombocladia is a new genus which the author refers provisionally to the Acanthocladiidæ. Streblotrypa ulrichi is a synonym for Streblotrypa prisca (Gabb and Horn).

CHRONOLOGICAL CATALOGUE OF PAPERS CONTAINING DESCRIPTIONS AND ILLUSTRATIONS OF AMERICAN MESOZOIC AND TERTIARY BRYOZOA, WITH LISTS OF THE SPECIES DESCRIBED THEREIN.

[Papers in which an asterisk (*) precedes the name of the author are of special importance to the student of bryozoa.]

1829.

Morton, Samuel G. Note: Containing a notice of some fossils recently discovered in New Jersey. In Vanuxem and Morton's observations on the geology and organic remains of the Secondary, Tertiary, and Alluvial formations of the Atlantic coast of the United States of America. Philadelphia, 1828. (Extract from Jour. Acad. Nat. Sci. Philadelphia, VI, 1829, pp. 120–129.)

On page 62 (p. 124 of the Journal) the author records the occurrence of fragments of Eschara, Flustra, and Retepora from the marl pits on Big Timber Creek.

1830.

Morton, Samuel G. Synopsis of the Organic Remains of the Ferruginous Sand Formation of the United States. (Amer. Jour. Sci. Arts, ser. 1, XVII, 1830, pp. 274–295.)

On page 288 the author notes the occurrence of fragments of Eschara, Flustra, and Retepora from Gloucester County, New Jersey.

1833.

Lea, Isaac. Contributions to Geology. Philadelphia, 1833. 227 pp., 6 pls.

The bryozoa described are—
Lunulites Bouei, p. 189, pl. vi, 202.
Lunulites Duclosii, p. 190, pl. vi, 203.
Orbitolites interstitia, p. 191, pl. vi, 204.
Orbitolites discoidea, p. 192, pl. vi, 205.
All are from the Eocene of Claiborne, Alabama.

1834.

Morton, Samuel G. Synopsis of the Organic Remains of the Cretaceous Group of the United States. Philadelphia, 1834. 88+8 pp., 19 pls.

The bryozoa described are—
Eschara digitata n. sp., p. 79, pl. xiii, 8.
Flustra sagena n. sp., p. 79, pl. xiii, 7.
Retepora sp. und., p. 79.
All come from the Cretaceous of New Jersey.

1841.

Conrad, T. A. Observations on the Secondary and Tertiary formations of the southern Atlantic States, by James T. Hodge. With an appendix by T. A. Conrad. (Amer. Jour. Sci. Arts, ser. 1, XLI, 1841, pp. 344-348.)

The bryozoa in the paper are—
Lunulites denticulata, p. 348.
Lunulites depressa, p. 348.
Medial Tertiary: Natural Well, Duplin County, North Carolina.

1845.

***Lonsdale, William.** Account of six species of Polyparia obtained from Timber Creek, New Jersey. (Quar. Jour. Geol. Soc. London, I, 1845, pp. 65-75, 22 figs. in text.)

The bryozoa described are—
Idmonea contortilis n. sp., p. 68.
Tubulipora Megæra n. sp., p. 69.
Cellepora tubulata n. sp., p. 70.
Escharina ? sagena (Morton), p. 71.
Eschara digitata Morton, p. 73.

***Lonsdale, William.** Report on the Corals from the Tertiary formations of North America. (Quar. Jour. Geol. Soc. London, I, 1845, pp. 495-509.)

The following bryozoa are included in the paper:
Heteropora ? tortilis n. sp., p. 500. Miocene: Williamsburg, Petersburg.
Escharina tumidula n. sp., p. 502. Miocene: Petersburg.
Lunulites denticulata Conrad, p. 503. Miocene: Petersburg.
Cellepora informata n. sp., p. 505. Miocene: Petersburg, Virginia.
Cellepora umbilicata n. sp., p. 507. Miocene: Petersburg.
Cellepora quadrangularis n. sp., p. 508. Miocene: Williamsburg, Evergreen.
Cellepora similis n. sp., p. 509. Miocene: Williamsburg.

***Lonsdale, William.** Account of twenty-six species of Polyparia obtained from the Eocene Tertiary formation of North America. (Quar. Jour. Geol. Soc. London, I, pp. 509-533.)

Tubulipora proboscidea ? (Milne-Edwards), p. 522. Eocene: Rock's Bridge.
Idmonea maxillaris n. sp., p. 523. Eocene: Wantoot, South Carolina.
Idmonea commiscens n. sp., p. 524. Eocene: Rock's Bridge.
Hippothoa tuberculum n. sp., p. 527. Eocene: Rock's Bridge.
Eschara tubulata n. sp., p. 528. Eocene: Wilmington.
Eschara petiolus n. sp., p. 528. Eocene: Eutaw.
Eschara incumbens n. sp., p. 529. Eocene: Rock's Bridge.
Eschara linea n. sp., p. 530. Eocene: Eutaw.
Eschara viminea n. sp., p. 530. Eocene: Eutaw.
Lunulites sexangula n. sp., p. 531. Eocene: Wilmington.
Lunulites distans n. sp., p. 531. Eocene: Wilmington, Wantoot(?).
Lunulites contigua n. sp., p. 533. Eocene: Wilmington.

1847.

Conrad, T. A. Observations on the Eocene formation, and descriptions of one hundred and five new fossils of that period, from the vicinity of Vicksburg, Mississippi, with an appendix. (Proc. Acad. Nat. Sci. Philadelphia, III, 1847, pp. 280–299.)

Lunulites Vicksburgensis, p. 296.

The same paper occurs also in Journal Acad. Nat. Sci. Philadelphia, ser. 2, I, 1848, pp. 111–134, pls. xi–xiv.

Lunulites vicksburgensis, p. 127.

1855.

Conrad, T. A. Note on the Miocene and Post-Pliocene deposits of California, with descriptions of two new fossil corals. (Proc. Acad. Nat. Sci. Philadelphia, VII, 1855, p. 441.)

Idmonea Californica, p. 441. Miocene: Santa Barbara, California.

Lichenopora Californica, p. 441. Miocene: Santa Barbara, California.

Obs. These deposits have since been determined to be of Pleistocene age.

1857.

Tuomey, M., and **Holmes, F. S.** Pleiocene Fossils of South Carolina. Charleston, 1857. xvi+152 pp., 30 pls.

The bryozoa are—

Lunulites denticulata Conrad, p. 11, pl. iv, 1–5. Darlington district, South Carolina.

Cellepora formosa n. sp., p. 12, pl. iv, 6. Darlington district, South Carolina.

Cellepora tessellata n. sp., p. 13, pl. iv, 7. Giles Bluff, Peedee River.

Cellepora radiata n. sp., p. 13, pl. iv, 8. Smith's, Goose Creek.

Cellepora depressa n. sp., p. 14, pl. iv, 9. Smith's, Goose Creek.

Membranipora lacinia n. sp., p. 14, pl. iv, 10. Smith's, Goose Creek.

Reptocelleporaria informata (Lonsdale), p. 15, pl. iv, 11, 12. Darlington district.

Reptocelleporaria similis (Lonsdale), p. 16, pl. iv, 13, 14. Darlington district, South Carolina; Petersburg, Va.

Heteropora tortilis Lonsdale, p. 16, pl. iv, 15, 16. Smith's, Goose Creek.

1858.

Emmons, Ebenezer. Report of the North Carolina Geological Survey. Raleigh, 1858. Paleontology, pp. 193–314.

The bryozoa described are—

Lunulites denticulata, p. 311, figs. 248, 249. Miocene: Beds on Neuse and Cape Fear rivers.

Lunulites contigua, p. 311, figs. 250, 251. Eocene: Wilmington, North Carolina.

Lunulites oblongus n. sp., p. 312, figs. 252, 253. Locality not given.

Discoporella umbellata, p. 312, figs. 254, 255. Locality not given.

1860.

* **Gabb, William M.**, and **Horn, George H.** Descriptions of new Cretaceous corals from New Jersey. (Proc. Acad. Nat. Sci. Philadelphia, XII, 1860, pp. 366–367.)

Hippothoa irregularis, p. 366.

Cellepora bilabiata, p. 366.

Cellepora carinata, p. 366.
Cellepora typica, p. 366.
Reticulipora sagena, p. 366.
Reptomulticava cepularis, p. 367.
Multicrescis parvicella, p. 367.
Localities are not given.

* **Gabb, William M., and Horn, George H.** Descriptions of new species of American Tertiary and Cretaceous fossils. (Jour. Acad. Nat. Sci. Philadelphia, ser. 2, IV, 1860, pp. 375–404.)

The bryozoa described are—

Hypothoa irregularis G. & H., p. 400, pl. lxix, 18, 20. Cretaceous: Timber Creek, New Jersey.

Cellepora bilabiata G. & H., p. 400, pl. lxix, 21, 23. Cretaceous: Timber Creek, New Jersey.

Cellepora carinata G. & H., p. 400, pl. lxix, 24, 26. Cretaceous: Timber Creek, New Jersey.

Cellepora typica G. & H., p. 400, pl. lxix, 27, 29. Cretaceous: Marl of New Jersey.

Reticulipora sagena G. & H., p. 400, pl. lxix, 30, 32. Cretaceous: Timber Creek, New Jersey.

Reptomulticava cepularis G. & H., p. 401, pl. lxix, 33, 35. Cretaceous: Timber Creek, New Jersey.

Multicrescis parvicella G. & H., p. 401, pl. lxix, 36, 38. Cretaceous: Timber Creek, New Jersey.

Acerviclausa n. gen. G. & H., p. 403.

Acerviclausa vermicularis G. & H., p. 403, pl. lxix, 42, 44. Cretaceous: Near Mullica Hill, New Jersey.

Heterocrisina n. gen. G. & H., p. 404.

Heterocrisina Abbottii G. & H., p. 404, pl. lxix, 45, 47. Cretaceous: Near Mullica Hill, New Jersey.

Holmes, Francis S. Postpleiocene fossils of South Carolina. Charleston, 1860. xii+v+122 pp., 28 pls.

The bryozoa described are—

Reptocelleporaria informata (Lonsdale), p. 6, pl. i, 5. Charleston, South Carolina.

Lunulites denticulata Conrad, p. 6, pl. ii, 4–4b. Simmons'; Abbapoola; St. Andrew's.

1862.

* **Gabb, William M., and Horn, George H.** Monograph of the fossil Polyzoa of the Secondary and Tertiary formations of North America. (Jour. Acad. Nat. Sci. Philadelphia, ser. 2, V, 1862, pp. 111–178, pls. xix–xxi.)

Eschara Lamarck, p. 114.

Eschara digitata Morton, p. 114. Cretaceous: Timber Creek and Mullica Hill, New Jersey.

Eschara tubulata Lonsdale, p. 115. Eocene: Wilmington, North Carolina.

Eschara petiolus Lonsdale, p. 116. Eocene: Eutaw, South Carolina.

Eschara incumbens Lonsdale, p. 116. Eocene: Rock's Bridge.

Eschara ? viminea Lonsdale, p. 116. Eocene: Eutaw, South Carolina.

Eschara texta n. sp., p. 117, pl. xix, 1. Eocene: Charleston, South Carolina.

Eschara ovalis n. sp., p. 118, pl. xix, 2. Eocene: Claiborne, Alabama.

Eschara ? fragilissima n. sp., p. 118, pl. xix, 3. Miocene: St. Marys River, Maryland.

Lunulites Lamarck, p. 119.

Lunulites sexangula Lonsdale, p. 119. Eocene: Wilmington, North Carolina.

Lunulites distans Lonsdale, p. 119. Locality not given.

Lunulites interstitia (Lea), p. 120. Eocene: Claiborne, Alabama.

Lunulites contigua Lonsdale, p. 121. Eocene: Wilmington, North Carolina.

Lunulites oblonga Emmons, p. 121. Miocene (?): North Carolina.

Semieschara D'Orbigny, p. 121.

Semieschara tubulata n. sp., p. 122, pl. xix, 5. Eocene: Claiborne, Alabama.

Cellepora Fabricius, p. 122.

Cellepora prolifica G. & H., p. 124. Cretaceous: Timber Creek, New Jersey.

Cellepora exserta n. sp., p. 125, pl. xix, 6. Cretaceous: Mullica Hill, New Jersey.

Cellepora Janewayi n. sp., p. 126, pl. xix, 7. Cretaceous: Seven miles below Yazoo, Mississippi.

Cellepora pumila n. sp., p. 126, pl. xix, 8. Cretaceous: Timber Creek, New Jersey.

Cellepora cycloris n. sp., p. 127, pl. xix, 9. Eocene: Claiborne, Alabama.

Cellepora inornata n. sp., p. 127, pl. xix, 10. Eocene: (?) Claiborne, Alabama.

Cellepora tumidula D'Orbigny, p. 127. Miocene: Petersburg, Virginia.

Cellepora formosa Tuomey and Holmes, p. 129. Miocene (? Pliocene): Darlington district, South Carolina.

Cellepora tessellata Tuomey and Holmes, p. 129. Miocene (? Pliocene): Giles Bluff, Peedee River, South Carolina.

Cellepora radiata Tuomey and Holmes, p. 129. Miocene (? Pliocene): Goose Creek, South Carolina.

Cellepora depressa Tuomey and Holmes, p. 129. Miocene (? Pliocene): Goose Creek, South Carolina.

Cellepora urceolata n. sp., p. 129, pl. xix, 11, Miocene: New Jersey.

Cellepora californiensis n. sp., p. 130, pl. xix, 12. Postpliocene: Santa Barbara, California.

Cellepora bellerophon n. sp., p. 130, pl. xix, 13. Postpliocene: Santa Barbara, California.

Reptocelleporaria D'Orbigny, p. 131.

Reptocelleporaria aspera n. sp., p. 131, pl. xix, 14. Cretaceous: Timber Creek and near Mullica Hill, New Jersey.

Reptocelleporaria informata D'Orbigny, p. 132. Miocene: Petersburg, Virginia; and South Carolina.

Reptocelleporaria quadrangularis D'Orbigny, p. 132. Locality not given.

Reptocelleporaria similis D'Orbigny, p. 133. Miocene (? Pliocene): Virginia and South Carolina.

Reptocelleporaria glomerata n. sp., p. 134, pl. xix, 15. Eocene: Vicksburg, Mississippi.

Escharipora D'Orbigny, p. 134.

Escharipora typica (G. & H.), p. 134, pl. xix, 16. Cretaceous: Timber Creek and and Mullica Hill, New Jersey.

Escharella D'Orbigny, p. 135.

Escharella micropora n. sp., p. 136, pl. xix, 17. Eocene: ? Alabama.

Repteschareila D'Orbigny, p. 136.

Repteschareila carolinensis n. sp., p. 136, pl. xix, 18. Eocene: Charleston, South Carolina.

Repteschareila Hermannii n. sp., p. 137, pl. xix, 20. Postpliocene: Santa Barbara, California.

Repteschareila plana n. sp., p. 137, pl. xix, 19. Postpliocene: Santa Barbara, California.

Pholidoloporidæ (new family), p. 138.

Pholidolopora n. gen., p. 138.

Pholidolopora labiata n. sp., p. 138, pl. xix, 21. Postpliocene: Santa Barbara, California.

Oligotresium n. gen., p. 139.

Oligotresium vicksburgensis (Conrad), p. 139, pl. xix, 22. Upper Eocene: Vicksburg, Mississippi.

Escharinella D'Orbigny, p. 140.

Escharinella muralis n. sp., p. 140, pl. xix, 23. Cretaceous: Mullica Hill, New Jersey.

Escharinella ? linea (Lonsdale), p. 140. Eocene: Eutaw, South Carolina.

Ennallipora n. gen., p. 141.

Ennallipora quadrangularis n. sp., p. 141, pl. xx, 24. Miocene: Petersburg, Virginia.

Discoporella D'Orbigny, p. 142.

Discoporella denticulata (Conrad), p. 142, pl. xx, 25. Miocene: Generally distributed from New Jersey to South Carolina.

Reptoporina D'Orbigny, p. 144.

Reptoporina carinata (G. & H.), p. 144. Locality not given.

Reptoporina customata n. sp., p. 144, pl. xx, 26. Postpliocene: Santa Barbara, California.

Multiporina n. gen., p. 145.

Multiporina umbilicata (Lonsdale), p. 145, pl. xx, 27. Miocene: Petersburg, Virginia.

Reptescharellina D'Orbigny, p. 146.

Reptescharenilla prolifera n. sp., p. 146, pl. xx, 28. Cretaceous: Mullica Hill, New Jersey.

Reptescharenilla disparilis n. sp., p. 147, pl. xx, 29. Postpliocene: Santa Barbara, California.

Reptescharenilla ? Hermannii n. sp., p. 147, pl. xx, 30. Postpliocene: Santa Barbara, California.

Reptescharenilla cornuta n. sp., p. 147, pl. xx., 31. Postpliocene: Santa Barbara, California.

Escharipora D'Orbigny, p. 148.

Escharipora distans n. sp., p. 148, pl. xx, 32. Cretaceous: Timber Creek, New Jersey.

Escharipora Abbottii n. sp., p. 149, pl. xx, 33. Cretaceous: Mullica Hill, New Jersey.

Escharipora immersa n. sp., p. 149. Cretaceous: Timber Creek, New Jersey.

Pliophloea, n. gen., p. 150.

Pliophloea sagena (Morton), p. 150, pl. xx, 34. Cretaceous: Timber Creek and Mullica Hill, New Jersey.

Reptescharipora D'Orbigny, p. 151.

Reptescharipora marginata n. sp., p. 151, pl. xx, 35. Cretaceous: Mullica Hill, New Jersey.

Biflustra D'Orbigny, p. 152.

Biflustra torta n. sp., p. 152, pl. xx, 36. Cretaceous: Timber Creek and Mullica Hill, New Jersey.

Biflustra disjuncta n. sp., p. 153, pl. xx, 37. Cretaceous: Timber Creek and Mullica Hill, New Jersey.

Siphonella Hagenow, p. 154.

Siphonella multipora n. sp., p. 154, pl. xx, 38. Postpliocene: Santa Barbara, California.

Discoflustrellaria D'Orbigny, p. 154.

Discoflustrellaria Bouei (Lea), p. 154. Eocene: Claiborne, Alabama.

Cupularia Lamarck, p. 155.

Cupularia discoidea (Lea), p. 155. Eocene: Claiborne, Alabama.

Heteractis n. gen., p. 156.

Heteractis Duclosii (Lea), p. 156, pl. xx, 39. Eocene: Claiborne, Alabama.

Pyripora D'Orbigny, p. 157.

Pyripora irregularis (G. & H.), p. 157, pl. xx, 40. Cretaceous: Timber Creek and Mullica Hill, New Jersey.

Membranipora Blainville, p. 157.

Membranipora abortiva n. sp., p. 157, pl. xx, 41. Cretaceous: Timber Creek and Mullica Hill, New Jersey.

Membranipora perampla n. sp., p. 158, pl. xx, 42. Cretaceous: Mullica Hill, New Jersey.

Membranipora plebia n. sp., p. 158, pl. xx, 43. Cretaceous: Mullica Hill, New Jersey.

Membranipora sexpunctata n. sp., p. 159, pl. xx, 44. Miocene or Eocene: Locality unknown.

Membranipora speciosa (G. & H.), p. 159, pl. xx, 45. Miocene (?): Chiriqui, Central America.

Membranipora Californica n. sp., p. 160, pl. xx, 46. Postpliocene: Santa Barbara, California.

Membranipora Barbarensis n. sp., p. 160, pl. xx, 47. Postpliocene: Santa Barbara, California.

Flustrella D'Orbigny, p. 160.

Flustrella capistrata n. sp., p. 161, pl. xx, 48. Cretaceous: Mullica Hill, New Jersey.

Flustrella cylindrica n. sp., p. 161, pl. xx, 49. Cretaceous: Mullica Hill, New Jersey.

Reptoflustrella D'Orbigny, p. 161.

Reptoflustrella ? heteropora n. sp., p. 162, pl. xx, 50. Cretaceous: Mullica Hill and Timber Creek, New Jersey.

Reptoflustrella tubulata n. sp., p. 162, pl. xx, 51. With Membranipora sexpunctata. Locality unknown, probably from the Virginia Miocene.

Pyriflustrella D'Orbigny, p. 163.

Pyriflustrella tuberculum D'Orbigny, p. 163. Locality not given.

Retelea D'Orbigny, p. 164.

Retelea ovalis n. sp., p. 164, pl. xxi, 52. Cretaceous: Mullica Hill, New Jersey.

Filifascigera D'Orbigny, p. 165.

Filifascigera megæra (Lonsdale), p. 165, pl. xxi, 53. Cretaceous: Timber Creek, New Jersey.

Fascipora D'Orbigny, p. 165.

Fascipora Americana n. sp., p. 165, pl. xxi, 54. Cretaceous: Timber Creek and Mullica Hill, New Jersey.

Spiropora D'Orbigny, p. 166.

Spiropora calamus n. sp., p. 166, pl. xxi, 55. Cretaceous: Timber Creek, New Jersey.

Idmonea Lamouroux, p. 167.

Idmonea contortilis Lonsdale, p. 167. Cretaceous: Timber Creek and Mullica Hill, New Jersey.

Idmonea maxillaris Lonsdale, p. 167. Eocene: Wantoot, South Carolina.

Idmonea commiscens Lonsdale, p. 168. Eocene: Rocks Bridge.

Idmonea Californica Conrad, p. 168, pl. xxi, 56. Postpliocene: Santa Barbara, California.

Semitubigera D'Orbigny, p. 169.

Semitubigera tuba n. sp., p. 169, pl. xxi, 57. Postpliocene: Santa Barbara, California.

Entalophora Lamouroux, p. 170.

Entalophora quadrangularis n. sp., p. 170, pl. xxi, 58. Cretaceous: Timber Creek and Mullica Hill, New Jersey.

Entalophora Conradii n. sp., p. 170, pl. xxi, 59. Cretaceous: Mullica Hill, New Jersey.

Entalophora proboscideoides (Lonsdale), p. 170, pl. xxi, 60. Eocene: ? **Alabama.**

Entalophora punctulata n. sp., p. 171, pl. xxi, 61. Postpliocene: **Santa Barbara, California.**

Diastopora Lamouroux, p. 171.

Diastopora lineata n. sp., p. 172, pl. xxi, 62. Cretaceous: **Timber Creek and Mullica Hill, New Jersey.**

Stomatopora Bronn, p. 172.

Stomatopora regularis n. sp., p. 172, pl. xxi, 63. Cretaceous: **New Jersey.**

Reticulipora D'Orbigny, p. 173.

Reticulipora sagena G. & H., p. 173. Cretaceous: **Timber Creek, New Jersey.**

Reticulipora dichotoma n. sp., p. 173, pl. xxi, 64. Cretaceous: **Timber Creek, New Jersey.**

Bicrisina D'Orbigny, p. 173.

Bicrisina Abbotii (G. & H.), p. 174, pl. xxi, 65. Cretaceous: **Mullica Hill, New Jersey.**

Crisina D'Orbigny, p. 174.

Crisina serrata n. sp., p. 174, pl. xxi, 66. Postpliocene: **Santa Barbara, California.**

Cavea D'Orbigny, p. 175.

Cavea prisca n. sp., p. 175, pl. xxi, 67. Carboniferous (?): **Fort Belknap, Texas.**

Lichenopora Defrance, p. 176.

Lichenopora Californica Conrad, p. 176, pl. xxi, 68. Postpliocene: **Santa Barbara, California.**

Reptomulticava D'Orbigny, p. 176.

Reptomulticava cepularis G. & H., p. 177. Cretaceous: **Timber Creek, New Jersey.**

Crescis D'Orbigny, p. 177.

Crescis labiata n. sp., p. 177, pl. xxi, 69. Cretaceous: **Mullica Hill and Timber Creek, New Jersey.**

Multicrescis D'Orbigny, p. 178.

Multicrescis parvicella G. & H., p. 178. pl. xxi, 70. Cretaceous: **Mullica Hill and Timber Creek, New Jersey.**

Multicrescis tortilis (Lonsdale), p. 178. Miocene (? Pliocene): **Virginia and South Carolina.**

Pumiscaria n. gen., p. 179. Type: "Alveolites glomeratus" Say, **from the seacoast of New Jersey.**

1870.

Credner, H. Die Kreide von New Jersey. (Zeitschriften der Deutsch. Geol. Gesellsch., XXII, 1870, pp. 191-251, pl. iv.)

Ditaxia compressa (Goldfuss), p. 220. Cretaceous: **Timber Creek, New Jersey.**

Eschara dichotoma (Goldfuss), p. 218. Cretaceous: **Brownsville, New Jersey.**

1879.

White, Charles A. Paleontological Papers No. 11. Remarks upon certain Carboniferous fossils from Colorado, Arizona, Idaho, and Wyoming, and certain Cretaceous corals from Colorado, together with descriptions of new forms. (Bull. U. S. Geol. Geogr. Sur. Terr. (Hayden's), V, pp. 209-221.)

Chætetes ?? demissus n. sp., p. 220. Cretaceous (Fox Hills group): **Six miles south of Fort Collins, Colorado.**

The author is inclined to think this a bryozoan.

White, Charles A. Report on the Paleontological Field Work for the season of 1877: Laramie Fossils. (Eleventh Ann. Rep. U. S. Geol. Geogr. Sur. Terr. (Hayden's), 1879, pp. 161–272.)

Membranipora (?), pp. 216, 217. Cretaceous (Laramie group): Point of Rocks Station, Wyoming.

Membranipora (?), p. 242. Cretaceous (Laramie group): Bear River Valley, Wyoming.

1882.

Ulrich, E. O. American Paleozoic Bryozoa. (Jour. Cincinnati Soc. Nat. Hist., V, 1882.)

Heteropora attenuata n. sp., p. 144, pl. vi, 12. Cretaceous: Pulaski County, Arkansas.

Heteropora consimilis n. sp., p. 145, pl. vi, 11. Cretaceous: Pulaski County, Arkansas.

1887.

White, Charles A. Contributions to the paleontology of Brazil. [Contribuições á Paleontologia do Brazil.] (Archivos do Museo Nacional do Rio de Janeiro, VII, 1887.)

Lunulites pileolus n. sp., pp. 208–209, pl. xviii, 21–23. Cretaceous: Rio Piabas, Provincia do Pará, Brazil.

1890.

Gregorio, Antonio de. Monographie de la Faune Eocenique de l'Alabama et surtout de celle de Claiborne de l'Etage Parisien. (Annales de Géologie et de Paléontologie. Livraisons VII, VIII. Palermo, 1890. 316 pp., 46 pls.)

The bryozoa described from the Eocene of Claiborne, Alabama, are:

Crisia læta De Greg., p. 239, pl. 39, f. 10, 11.

Myriozoum propepunctatum De Greg., p. 239, pl. 39, f. 12–13.

Myriozoum fervens De Greg., p. 239, pl. 39, f. 14–15.

Idmonea subdisticha De Greg., p. 239, pl. 39, f. 16–20.

Entalophora proboscidoides G. & H., p. 240, pl. 39, f. 26–27.

Entalophora amœna De Greg., p. 240, pl. 39, f. 21.

Hornera mirifica De Greg., p. 240, pl. 39, f. 31–32.

Hornera multiramosa De Greg., p. 240, pl. 39, f. 28–30.

Hornera claibornensis De Greg., p. 241, pl. 39, f. 22–23, 33–34.

Hornera sp. (?), p. 241, pl. 39, f. 24–25.

Eschara (?) spongiopsis De Greg., p. 241, pl. 40, f. 1-2.

Eschara ovalis G. & H., p. 241, pl. 40, f. 3–5.

Escharella sifra De Greg., p. 242, pl. 40, f. 6–7.

Escharella micropora G. & H., p. 242, pl. 40, f. 8–22, 23.

Escharella micropora var. asperulata De Greg., p. 242, pl. 40, f. 21–22.

Semieschara tubulata G. & H., p. 242, pl. 40, f. 24–28, 29–31.

Vincularia (?) insolita De Greg., p. 243, pl. 40, f. 32–37.

Lunulites (Discoflustrellaria) Bouei Lea, p. 243, pl. 41, f. 1–4, 5–6, 7–9; pl. 42, f. 1–6.

Idem, var. concava De Greg., p. 244, pl. 41, f. 10–14.

Idem, var. depressa De Greg., p. 244, pl. 41, f. 15–19.

Idem, var. ellipsoides De Greg., p. 245, pl. 41, f. 20–21, 23–25.

Idem, var. Ducloeii (Lea) De Greg., non G. & H., p. 245, pl. 41, f. 26–31, 32–33.
Idem, var. truncata De Greg., p. 245, pl. 41, f. 34–46.
Idem, var. almina De Greg., p. 246, pl. 42, f. 7–10.
Idem, var. tiza De Greg., p. 246, pl. 42, f. 11–12.
Idem, var. minutecellulata De Greg., p. 246, pl. 42, f. 13–15.
Batopora convivialis De Greg., p. 246, pl. 42, f. 30–33.
Cellepora inornata G. & H., p. 247, pl. 43, f. 2, 3–4.
Cellepora cycloris G. & H., p. 247, pl. 43, f. 1.
Celleporaria figula De Greg., p. 247, pl. 43, f. 5–6.
Biflustra (?) supradubia De Greg., p. 248, pl. 43, f. 11–12.
Membranipora simplex De Greg., p. 248, pl. 43, f. 7–8.
Membranipora contemplata De Greg., p. 248, pl. 43, f. 9–10.
Dimiclausa De Greg., n. subgen., p. 248.
Lunulites (Dimiclausa) fenestrata De Greg., p. 249, pl. 42, f. 23–27.
Lunulites (Cupularia) interstitia (Lea) De Greg., p. 249, pl. 42, f. 16–21, 22.
Cupularia discoidea Lea sp., p. 249, pl. 42, f. 28.
Lunulites distans Lonsdale, sp. dub., p. 250, pl. 42, f. 29.

CATALOGUE OF THE GENERA AND SPECIES OF AMERICAN PALEOZOIC BRYOZOA, INCLUDING BIBLIOGRAPHY AND SYNONYMY.

ACANTHOCLADIA King. Genotype: Ceratophytes anceps Schlotheim.

1849. Acanthocladia. King, Ann. Mag. Nat. Hist., ser. 2, II, p. 389.
1850. Acanthocladia. King, Mon. British Permian Foss., p. 48.
1860. Acanthocladia. Eichwald, Lethæa Rossica, I, p. 384.
1880. Acanthocladia. Zittel, Handb. der Pal., p. 603.
1885. Acanthocladia. Waagen and Pichl, Pal. Indica, Ser. XIII, p. 811.
1886. Acanthocladia. Ulrich, Contr. American Pal., I, p. 6.
1889. Acanthocladia. Miller, North American Geol. Pal., p. 291.
1890. Acanthocladia. Ulrich, Geol. Surv. Illinois, VIII, pp. 398, 635.
1896. Acanthocladia. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 283.
1897. Acanthocladia. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 522.

Acanthocladia americana Swallow. Not recognizable.

1858. Acanthocladia anceps ? Schlotheim. If distinct A. americana proposed. Swallow, Trans. St. Louis Acad. Sci., I, p. 180.
1859. Acanthocladia americana. Shumard, Trans. St. Louis Acad. Sci., I, p. 388.
1860. Acanthocladia americana. Meek and Hayden, Proc. Acad. Nat. Sci., Philadelphia, p. 24.

Lower Permian or Upper Coal Measures: Cottonwood Valley, Kansas; Guadalupe Mountains, Texas and New Mexico.

Acanthocladia anceps Swallow (not Schlotheim). See Acanthocladia americana Swallow.

Acanthocladia fruticosa Ulrich.

1890. Acanthocladia fruticosa. Ulrich, Geol. Surv. Illinois, VIII, p. 635, pl. lxv, 2–2c.

Upper Coal Measures: Springfield, Illinois.

ACANTHOCLEMA Hall. Genotype: Trematopora alternata Hall.

1886. Acanthoclema. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, explanation pl. xxv.
1887. Acanthoclema. Hall and Simpson, Pal. New York, VI, p. xv.
1889. Acanthoclema. Miller, North American Geol. Pal., p. 291.
1890. Acanthoclema. Ulrich, Geol. Surv. Illinois, VIII, pp. 402, 661.
1897. Acanthoclema. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 552.

Acanthoclema alternatum (Hall).

1883. Trematopora alternata. Hall, Trans. Albany Institute, X, p. 148 (abstract, 1881, p. 6).
1886. Acanthoclema alternata. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxv, 8–10.
1887. Acanthoclema alternatum. Hall and Simpson, Pal. New York, VI, p. 72, pl. xxv, 8–10.

Acanthoclema alternatum (Hall)—Continued.

1897. Acanthoclema alternatum. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xvi, 6, 7.
Upper Helderberg: Onondaga Valley, New York.

Acanthoclema bispinulatum Miller. See **Orthopora bispinulata** (Hall).

Acanthoclema confluens (Ulrich).

1888. Rhombopora confluens. Ulrich, Bull. Denison Univ., IV, p. 91, pl. xiv, 17.
1890. Acanthoclema confluens, Ulrich. Geol. Surv. Illinois, VIII, p. 662, pl. lxx, 5-5*b*.
Waverly: Lodi, Ohio.
Keokuk: Nauvoo, Illinois.

Acanthoclema divergens Hall and Simpson.

1883. Trematopora? sp. indt. Hall, Rep. State Geologist New York for the year 1882, pl. xxv, 2.
1887. Acanthoclema divergens. Hall and Simpson, Pal. New York, VI, p. 73, pl. xxviii, 2.
Upper Helderberg: Onondaga Valley, New York.

Acanthoclema Hamiltonense Hall and Simpson. See **Streblotrypa hamiltonensis** (Nicholson).

Acanthoclema ovatum Hall and Simpson.

1883. Trematopora? sp. indt. Hall, Rep. State Geologist New York for the year 1882, pl. xxv, 3.
1887. Acanthoclema ovatum. Hall and Simpson, Pal. New York, VI, p. 73, pl. xxviii, 3.
Upper Helderberg: Onondaga Valley, New York.

Acanthoclema scutulatum Hall and Simpson. See **Streblotrypa scutulata** (Hall) and **Rhombopora reticulata** (Hall).

Acanthoclema sulcatum Hall and Simpson.

1887. Acanthoclema sulcatum. Hall and Simpson, Pal. New York, VI, p. 192, pl. lv. 7, pl. lvi. 7.
Hamilton: Near Canandaigua Lake, New York.

Acanthoclema triseriale (Hall).

1883. Stictopora? triserialis. Hall, Rep. State Geologist New York for the year 1882, pl. xxv, 6, 7.
1887. Acanthoclema triseriale, Hall and Simpson, Pal. New York, VI, p. 74, pl. xxviii, 6, 7.
Upper Helderberg: Near Caledonia, New York.

ACROGENIA Hall. Genotype: Acrogenia prolifera Hall.

1883. Acrogenia. Hall, Trans. Albany Institute, X, p. 193 (abstract, 1881, p. 193).
1884. Acrogenia. Hall, Rep. State Geologist New York for the year 1883, p. 51.
1887. Acrogenia. Hall and Simpson, Pal. New York, VI, p. xx.
1889. Acrogenia. Miller, North American Geol. Pal., p. 291.
1890. Acrogenia. Ulrich, Geol. Surv. Illinois, VIII, p. 388.
1897. Acrogenia. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 544.
1899. Acrogenia. Grabau, Bull. Buffalo Acad. Nat. Sci., VI, p. 175.

Acrogenia prolifera Hall.

1883. Acrogenia prolifera. Hall, Trans. Albany Institute, X, p. 194 (abstract, 1881, p. 194).

Acrogenia prolifera Hall—Continued.

1884. Acrogenia prolifera. Hall, Rep. State Geologist New York for the year 1883, p. 52.
1887. Acrogenia prolifera. Hall and Simpson, Pal. New York, VI, p. 267, pl. lxiii, 7-15.
1889. Acrogenia prolifera. Miller, North American Geol. Pal., fig. 448 (p. 291).
1897. Acrogenia prolifera. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xv, 11-20.
1899. Acrogenia prolifera. Grabau, Bull. Buffalo Acad. Nat. Sci., VI, p. 175, fig. 72.

Hamilton: Bellona, Lodi Landing (Seneca Lake), and Darien Center, New York.

Actinostoma. Young and Young. See Fenestella Lonsdale.

ACTINOTRYPA Ulrich. Genotype: Fistulipora peculiaris Rominger.

1889. Actinotrypa. (Ulrich, in press), Miller, North American Geol. Pal., p. 291.
1890. Actinotrypa. Ulrich, Geol. Surv. Illinois, VIII, p. 386.
1897. Actinotrypa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 540.

Actinotrypa peculiaris (Rominger).

1866. Fistulipora peculiaris. Rominger, Proc. Acad. Nat. Sci. Philadelphia, p. 123.
1890. Actinotrypa peculiaris. Ulrich, Geol. Surv. Illinois, VIII, p. 503, pl. lxxvii, 3-3*b*.
1894. Actinotrypa peculiaris. Keyes, Missouri Geol. Surv., V, p. 18, pl. xxxiv, 6.
1897. Actinotrypa peculiaris. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 97-99 (p. 540).

Keokuk: Lagrange, Missouri; Keokuk, Iowa; Warsaw and Nauvoo, Illinois.

Alecto of authors. See Stomatopora Bronn.

Alecto auloporoides Nicholson. See Proboscina auloporoides (Nicholson).

Alecto? Canadensis Nicholson. See Hederella canadensis (Nicholson).

Alecto confusa Nicholson. See Proboscina confusa (Nicholson).

Alecto frondosa Nicholson. See Proboscina frondosa (Nicholson).

Alecto inflata Hall. See Stomatopora inflata (Hall).

Alecto nexilis James. See Batostoma implicatum (Nicholson).

Alveolites Lamarck. Not a bryozoan genus.

Alveolites expansa James. See Ceramopora expansa (James).

Alveolites exsul Hall. See Lioclema? exsul (Hall).

Alveolites irregularis Whitfield. See Ceramoporella? irregularis (Whitfield).

AMPLEXOPORA Ulrich. Genotype: Amplexopora cingulata Ulrich.

1882. Amplexopora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 154.
1883. Amplexopora. Foord, Contr. Micro-Pal. Cambro.-Sil., p. 15.
1889. Amplexopora. Miller, North American Geol. Pal., p. 291.
1890. Amplexopora. Ulrich, Geol. Surv. Illinois, VIII, pp. 377, 450.
1896. Amplexopora. Ulrich, Zittel's Textb. Pal. (Engl. Ed.), p. 278.
1897. Amplexopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 577.

Amplexopora affinis Ulrich. See Heterotrypa affinis (Ulrich).

Amplexopora barrandei Ulrich. See Heterotrypa ? barrandei (Nicholson).

Amplexopora Canadensis Foord. See Batostoma canadense (Foord).

Amplexopora cingulata Ulrich.

1882. Amplexopora cingulata. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 254, pl. xi, 5–5*c*.
1889. Amplexopora cingulata. Miller, North American Geol. Pal., fig. 449 (p. 292).
1890. Amplexopora cingulata. Ulrich, Geol. Surv. Illinois, VIII, fig. 3*c* (p. 308), fig. 4*c* (p. 309).
1894. Amplexopora cingulata. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 193.
Cincinnati (Lorraine): McKinney's Station and Boyle County, Kentucky; Cincinnati, Ohio.

Amplexopora ? discoidea (Nicholson).

1871. Chætetes discoideus. James, Catal. Foss. Cincinnati group. (Not defined, only named.)
1874. Chætetes discoideus. Nicholson, Quar. Jour. Geol. Soc. London, XXX, p. 511, pl. xxx, 4–4*d*.
1875. Chætetes discoideus. Nicholson, Pal. Ohio, II, p. 206, pl. xxi, 15–15*c*.
1875. Chætetes discoideus. Nicholson, Pal. Province Ontario, pp. 10, 32.
1876. Chætetes discoideus. Nicholson, Ann. Mag. Nat. Hist., ser. 4, XVIII, p. 88, pl. v, 7, 7*a*.
1881. Monticulipora (Monotrypa) discoidea. Nicholson, Genus Monticulipora, p. 193, pl. iv, 3–3*f*.
1882. Amplexopora discoidea. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 255.
1883. Leptotrypa discoidea. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 158.
1883. Amplexopora discoidea. Foord, Contr. Micro-Pal. Cambro-Sil., p. 17.
1883. Monticulipora discoidea. Hall, Twelfth Ann. Rep. Indiana Geol. Nat. Hist., p. 247, pl. x, 4, 5.
1888. Monticulipora discoidea. James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 163.
1894. Monticulipora discoidea. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 178.
Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.
Trenton: Ottawa (Foord) and Weston (Nicholson), Canada.
Obs. The forms from Canada identified as Amplexopora discoidea by Nicholson and by Foord may be specifically distinct.

Amplexopora filiosa (D'Orbigny).

1850. Monticulipora filiasa. D'Orbigny, Prodr. de Pal., I, p. 25.
1851. Chætetes filiasa. Milne-Edwards and Haime, Pol. Foss. Terr. Pal., p. 261.
1860. Monticulipora filiosa. Milne-Edwards, Hist. Nat. des Corall., III, p. 274.
1875. Chætetes filiasa (?). Nicholson, Pal. Ohio, II, p. 206.
1883. Monotrypa (?) filiasa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 163.
1888. Monticulipora filiasa. James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 162.
1890. Leptotrypa filiosa. Ulrich, Geol. Surv. Illinois, VIII, p. 456, pl. xxxvi, 7, 7*a*.
1893. Monticulipora filiasa. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XV, p. 158.

Amplexopora filiosa (D'Orbigny)—Continued.

1896. Monticulipora subcylindrica (James, U. P., *mss.*). J. F. James, Jour Cincinnati Soc. Nat. Hist., XVIII, p. 123, fig. 13*a–c*.

Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity; Maury County, Tennessee. Trenton: Calhoun County, Illinois (Ulrich).

Obs. The form from Calhoun County, Illinois, identified as above, is probably specifically distinct.

Amplexopora moniliformis Ulrich. See Heterotrypa? moniliformis (Nicholson).

Amplexopora petasiformis (Nicholson).

1878. Chætetes petropolitanus. James, Paleontologist, No. 2, p. 11.

1881. Monticulipora (Monotrypa) petasiformis. Nicholson, Genus Monticulipora, p. 190, fig. 40.

1882. Monotrypa petasiformis. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 256.

1883. Monotrypa? petasiformis. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 163.

1888. Monticulipora petasiformis. James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 168.

1894. Monticulipora petasiformis. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 186.

Cincinnati (Utica): Cincinnati, Ohio, and vicinity.

Amplexopora petasiformis-welchi (James).

1882. Monticulipora (Monotrypa) welchi. James, Paleontologist, No. 6, p. 50. ibid., No. 7, pl. i, 4–4*c*, 1883.

1888. Monticulipora petasiformis var. welchi. James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 169.

1894. Monticulipora petasiformis var. welchi. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 187.

Cincinnati (Utica): Cincinnati, Ohio, and vicinity.

Amplexopora pustulosa Ulrich.

1890. Amplexopora pustulosa. Ulrich, Geol. Surv. Illinois, VIII, p. 451, pl. xxxvi, 3–3*c*.

1895. Monticulipora pustulosa. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 72.

Cincinnati (Richmond): Hanover and Clarksville, Ohio.

Amplexopora robusta Ulrich.

1883. Amplexopora robusta. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 82, pl. i, 1–1*b*.

1889. Amplexopora robusta. Miller, North American Geol. Pal., fig. 450 (p. 292).

1890. Amplexopora robusta. Ulrich, Geol. Surv. Illinois, VIII, fig. 7*d* (p. 318).

Cincinnati (Lorraine): Cincinnati, Ohio; Boyle County, Kentucky.

Amplexopora septosa (Ulrich).

1879. Atactopora septosa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., II, p. 125, pl. xii, 7–7*c*.

1882. Amplexopora septosa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 255.

1888. Monticulipora septosa. James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 180.

1894. Monticulipora septosa. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 203.

Cincinnati (Utica and Lorraine): Covington and Newport, Kentucky; Cincinnati, Ohio.

Amplexopora superba Foord. See **Batostoma superbum (Foord).**

Amplexopora superba Ulrich (not Foord). See **Batostoma minnesotense** Ulrich.

Amplexopora winchelli Ulrich. See **Batostoma winchelli (Ulrich).**

Anastomopora Simpson. See **Reteporidra.**

Anastomopora cinctuta Simpson. See **Reteporidra cinctuta (Hall).**

ANISOTRYPA Ulrich. Genotype: **Anisotrypa symmetrica** Ulrich.

1883. Anisotrypa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 275.
1889. Anisotrypa. Miller, North American Geol. Pal., p. 292.
1890. Anisotrypa. Ulrich, Geol. Surv. Illinois, VIII, pp. 376, 447.
1896. Anisotrypa. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 277.

Anisotrypa elegantula Ulrich. See **Rhombopora elegantula (Ulrich).**

Anisotrypa fistulosa Ulrich.

1890. Anisotrypa fistulosa. Ulrich, Geol. Surv. Illinois, VIII, p. 448, pl. lxxii, 6–6*c*.
Ste. Genevieve: Pella, Iowa.

Anisotrypa ramulosa Ulrich.

1890. Anisotrypa ramulosa. Ulrich, Geol. Surv. Illinois, VIII, p. 449, pl. lxxii, 7–7*a*.
Ste. Genevieve: Pella, Iowa.

Anisotrypa solida Ulrich.

1890. Anisotrypa solida. Ulrich, Geol. Surv. Illinois, VIII, p. 449, pl. lxxii, 9–9*e*.
1894. Anisotrypa solida. Keyes, Missouri Geol. Surv., V, p. 16.
Chester: Sloans Valley, Kentucky; Chester, Illinois.

Anisotrypa symmetrica Ulrich.

1883. Anisotrypa symmetrica. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 276, pl. xiii, 5–5*c*.
1890. Anisotrypa symmetrica. Ulrich, Geol. Surv. Illinois, VIII, p. 448, pl. lxxii, 5.
Chester: Grayson Springs and Sloans Valley, Kentucky; Chester, Illinois.

ANOLOTICHIA Ulrich. Genotype: Anolotichia ponderosa Ulrich.

1890. Anolotichia. Ulrich, Geol. Surv. Illinois, VIII, pp. 381, 473.
1893. Anolotichia. Ulrich, Geol. Minnesota, III, p. 326.
1896. Anolotichia. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 268.

Anolotichia impolita (Ulrich).

1886. Crepipora impolita. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Surv. Minnesota, p. 77.
1893. Anolotichia impolita. Ulrich, Geol. Minnesota, III, p. 327, pl. xxviii, 15–20.
1896. Anolotichia impolita. Ulrich, Zittel's Textb. Pal. (Engl. ed.), fig. 437A–C (p. 268).
Trenton (Stones River): Minneapolis, St. Paul, Chatfield, Cannon Falls, Lanesboro, and Fountain, Minnesota.

Anolotichia ponderosa Ulrich.

1890. Anolotichia ponderosa. Ulrich, Geol. Surv. Illinois, VIII, p. 473, pl. xli, 3–3*d*, fig. 8*c* (p. 320).
1896. Anolotichia ponderosa. Ulrich, Zittel's Textb. Pal. (Engl. ed.), fig. 437D (p. 268).
Cincinnati (Richmond): Wilmington, Illinois.

Arcanopora Vine. See Cystodictya Ulrich.

ARCHIMEDES Owen. Genotype: Archimedes wortheni (Hall).

1842. Archimedes. (Le Seuer) Owen, American Jour. Sci., XLIII, p. 19.
1857. Archimedes. Hall, Proc. American Assoc. Adv. Sci., X, p. 176.
1858. Archimedes. Hall, Pal. Iowa, p. 651.
1882. Archimedes. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 150.
1883. Archimedes. Claypole, Quar. Jour. Geol. Soc. London, XXXIX, p. 31.
1885. Archimedes. Hall, Rep. State Geologist New York for the year 1884, p. 37.
1885. Archimedes. Waagen and Pichl, Pal. Indica, Ser. XIII, p. 774.
1886. Archimedes. Ulrich, Contr. American Pal., I, p. 5.
1889. Archimedes. Miller, North American Geol. Pal., p. 292.
1890. Archimedes. Ulrich, Geol. Surv. Illinois, VIII, pp. 396, 565.
1895. Archimedes. Simpson, Thirteenth Ann. Rep. State Geologist New York for the year 1893, p. 726; Forty-fourth Ann. Rep. New York State Museum, p. 920.
1896. Archimedes. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 282.
1897. Archimedes. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pp. 519, 522.
1850. Archimedipora. D'Orbigny, Prodr. de Pal., I, p. 102.

Archimedes communis Ulrich.

1890. Archimedes communis. Ulrich, Geol. Surv. Illinois, VIII, p. 573, pl. lxiii, 1-1*d*.
Chester: Sloans Valley, Kentucky.

Archimedes compactus Ulrich.

1890. Archimedes compactus. Ulrich, Geol. Surv. Illinois, VIII, p. 572, pl. lxiii, 2-2*b*, 2*d* (not 2*c*).
Chester: Sloans Valley, Kentucky.

Archimedes distans Ulrich.

1890. Archimedes distans. Ulrich, Geol. Surv. Illinois, VIII, p. 578, pl. lxiii, 9-9*b*.
Chester: Chester, Illinois; Sloans Valley, Kentucky.

Archimedes grandis Ulrich.

1890. Archimedes grandis. Ulrich, Geol. Surv. Illinois, VIII, p. 569, pl. lxiii, 10.
Keokuk: Jersey County, Illinois.

Archimedes intermedius Ulrich.

1890. Archimedes intermedius. Ulrich, Geol. Surv. Illinois, VIII, p. 574, pl. lxiii, 2*c*.
Chester: Chester, Illinois; Sloans Valley, Kentucky.

Archimedes invaginatus Ulrich.

1890. Archimedes invaginatus. Ulrich, Geol. Surv. Illinois, VIII, p. 575, pl. lxiii, 11*a*, 11*c*.
Chester: Chester, Illinois.

Archimedes laxa White (not Hall). See Archimedes owenanus (Hall).

Archimedes laxus (Hall).

1857. Fenestella (Archimedes) laxa. Hall, Proc. American Assoc. Adv. Sci., X, p. 178.
1890. Archimedes laxus. Ulrich, Geol. Surv. Illinois, VIII, p. 580, pl. lxiii, 15, 15*a*.
1894. Archimedes laxus. Keyes, Missouri Geol. Surv., V, p. 27.
1883. Helicopora archimediformis. Claypole, Quar. Jour. Geol. Soc. London, XXXIX, p. 34, pl. iv, 3, 4.

Archimedes laxus (Hall)—Continued.

1897. Helicopora archimediformis. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 70, 3, 4 (p. 518).

Chester: Chester, Illinois; Litchfield, Kentucky.

Archimedes meekanus (Hall).

1857. Fenestella (Archimedes) Meekana. Hall, Proc. American Assoc. Adv. Sci., X, p. 178.

1890. Archimedes meekanus. Ulrich, Geol. Surv. Illinois, VIII, p. 578, pl. lxiii, 4.

Chester: Chester, Illinois; Sloans Valley and Grayson Springs, Kentucky.

Archimedes negligens Ulrich.

1890. Archimedes negligens. Ulrich, Geol. Surv. Illinois, VIII, p. 569, pl. lxiii, 7, 7*a*.

Keokuk: Keokuk and Bentonsport, Iowa.

Archimedes owenanus (Hall).

1857. Fenestella (Archimedes) Owenana. Hall, Proc. American Assoc. Adv. Sci., X, p. 178.

1890. Archimedes owenanus. Ulrich, Geol. Surv. Illinois, VIII, p. 570, pl. lxiii, 6–6*c*.

1894. Archimedes owenanus. Keyes, Missouri Geol. Surv., V, p. 26, pl. xxxiii, 2.

1882. Archimedes laxa. White, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 361, pl. xli, 7.

Keokuk: Keokuk, Iowa; Appanoosa, near Quincy, Illinois; St. Francisville, Missouri.

Archimedes perminimus Ulrich.

1890. Archimedes perminimus. Ulrich, Geol. Surv. Illinois, VIII, p. 572, pl. lxiii, 13, 11 (in part).

Chester: Chester, Illinois.

Archimedes proutanus Ulrich.

1890. Archimedes proutanus. Ulrich, Geol. Surv. Illinois, VIII, p. 576, pl. lxiii, 3–3*c*, 11, 11*b*.

Chester: Sloans Valley, Kentucky; Chester, Illinois.

Archimedes reversa Hall. See Archimedes wortheni Hall.

Archimedes sublaxus Ulrich.

1890. Archimedes sublaxus. Ulrich, Geol. Surv. Illinois, VIII, p. 579, pl. lxiii, 14.

Chester: Chester, Illinois.

Archimedes swallovanus (Hall).

1857. Fenestella (Archimedes) Swallovana. Hall, Proc. American Assoc. Adv Sci., X, p. 178.

1890. Archimedes swallovanus. Ulrich, Geol. Surv. Illinois, VIII, p. 574, pl. lxiii, 12–12*d*.

1894. Archimedes swallovanus. Keyes, Missouri Geol. Surv., V, p. 26.

Chester: Chester and Kaskaskia, Illinois; Crittenden County, Kentucky.

Archimedes terebriformis Ulrich.

1890. Archimedes terebriformis. Ulrich, Geol. Surv. Illinois, VIII, p. 575, pl. lxiii, 5–5*c*.

Chester: Chester, Illinois; Sloans Valley and Grayson Springs, Kentucky.

Archimedes wortheni (Hall).

1852. Retepora archimedes. Owen, Rep. Geol. Surv. Wisconsin, Iowa, and Minnesota, pl. iv, 1.

Archimedes wortheni (Hall)—Continued.

1881. Retepora Archimedes. Quenstedt, Roehren- und Sternkorallen, p. 174, pl. cl. 4–10.
1857. Fenestella (Archimedes) Wortheni. Hall, Proc. American Assoc. Adv. Sci., X, p. 178.
1858. Archimedes Wortheni. Hall, Pal. Iowa, p. 651, pl. xxii, 3, 4*a*, *b*, 5*a*, *b*.
1889. Archimedes wortheni. Miller, North American Geol. Pal., fig 452 (p. 292).
1890. Archimedes wortheni. Ulrich, Geol. Surv. Illinois, VIII, p. 571, pl. lxiii, 8, 8*a*.
1894. Archimedes wortheni. Keyes, Missouri Geol. Surv., V, p. 26, pl. xxxiii, 1.
1896. Archimedes Wortheni. Ulrich, Zittel's Textb. Pal. (Engl. ed.), fig. 468 (p. 282).
1897. Archimedes Wortheni. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 71, 72 (p. 519).
1858. Archimedes reversa. Hall, Pal. Iowa, p. 652, pl. xxii, 2.
1889. Archimedes reversus. Miller, North American Geol. Pal., fig. 451 (p. 292).

Warsaw: Warsaw, Illinois.

Archimedipora D'Orbigny. See Archimedes Owen.

Archimedipora Simpson (not D'Orbigny).

1895. Archimediopora. Simpson, Thirteenth Ann. Rep. State Geologist New York for the year 1893, pp. 701, 723, 726; Forty-seventh Ann. Rep. New York State Mus., pp. 895, 917, 920.
1897. Archimedipora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 522.

Obs. This genus as defined by Mr. Simpson is imaginary. The author cites no species. We know of no species of Archimedes with more than two rows of apertures on a branch.

ARTHROCLEMA Billings. Genotype: Arthroclema pulchellum Billings.

1862. Arthroclema. Billings, Pal. Foss., I, p. 54.
1882. Arthroclema (in part). Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 151.
1886. Arthroclema. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Surv. Minnesota, p. 60.
1888. Arthroclema. Ulrich, American Geologist, I, p. 232.
1889. Arthroclema. Miller, North American Geol. Pal., p. 293.
1890. Arthroclema. Ulrich, Jour. Cincinnati Soc. Nat. Hist., XII, p. 192.
1890. Arthroclema. Ulrich, Geol. Surv. Illinois, VIII, p. 400.
1893. Arthroclema. Ulrich, Geol. Minn., III, p. 197.
1896. Arthroclema. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 281.
1897. Arthroclema. Simpson, Fourteenth Ann. Rep. State Geologist, New York, for the year 1894, p. 546.

Arthroclema angulare Ulrich.

1889. Arthroclema angulare. Ulrich, Contr. Micro-Pal. Cambro-Sil., Part II, p. 45.
1890. Arthroclema angulare. Ulrich, Geol. Surv. Illinois, VIII, p. 641, pl. xxix, 6–6*b*.
1895. Arthroclema angulare. Whiteaves, Pal. Foss., III, p. 117.

Cincinnati (Richmond): Wilmington, Illinois; Stony Mountain, Manitoba.

Obs. See Helopora imbricata Ulrich.

Arthroclema armatum Ulrich.

1890. Arthroclema armatum. Ulrich, Jour. Cincinnati Soc. Nat. Hist., XII, p. 194, fig. 19*a*–*d* (not *e*–*h*=Arthroclema pulchellum Billings).
1893. Arthroclema armatum. Ulrich, Geol. Minnesota, III, p. 201, pl. ii, 8–11, 25, 28–33, pl. iii, 7.

Arthroclema armatum Ulrich—Continued.

1897. Arthroclema armatum. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 111 (p. 547).
Trenton: Cannon Falls and St. Paul, Minnesota.

Arthroclema billingsi Ulrich.

1890. Arthroclema billingsi. Ulrich, Geol. Surv. Illinois, VIII, p. 642.
1893. Arthroclema billingsi. Ulrich, Geol. Minnesota, III, p. 197, pl. ii, 7.
1897. Arthroclema Billingsi. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 105 (p. 547).
Trenton: Ottawa, Canada.

Arthroclema cornutum Ulrich.

1890. Arthroclema cornutum. Ulrich, Jour. Cincinnati Soc. Nat. Hist., XII, p. 193, fig. 18.
1893. Arthroclema cornutum. Ulrich, Geol. Minnesota, III, p. 200, pl. ii, 16–21, 23, pl. iii, 34.
1897. Arthroclema cornutum. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 106–108, 112 (p. 547).
Trenton (Black River): Minneapolis, Minnesota.

Arthroclema pulchellum Billings.

1862. Arthroclema pulchellum. Billings, Pal. Foss., I, p. 54, fig. 60.
1890. Arthroclema pulchellum. Ulrich, Geol. Surv. Illinois, VIII, p. 642, pl. xxix, 6c.
1893. Arthroclema pulchellum. Ulrich, Geol. Minnesota, III, pl. ii, 12–15.
1890. Arthroclema armatum (in part). Ulrich, Jour. Cincinnati Soc. Nat. Hist., XII, p. 194, fig. 19 *e–h* (not 19 *a–d*).
Trenton: Ottawa City and Peterboro, Canada.

Arthroclema spiniforme Ulrich. See Helopora spiniformis (Ulrich).

Arthroclema striatum Ulrich.

1893. Arthroclema striatum. Ulrich, Geol. Minn., III, p. 198, pl. ii, 22, 24, pl. iii, 28–33.
1897. Arthroclema striatum. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 109, 110 (p. 547).
Trenton (Black River): Minneapolis and St. Paul, Minnesota.

Arthronema Ulrich (preoccupied). See Arthrostylus Ulrich.

Arthronema curtum Ulrich. See Arthrostylus curtus (Ulrich).

Arthronema tenue Ulrich. See Arthrostylus tenuis (James).

ARTHROPORA Ulrich. Genotype: Ptilodictya (Stictopora) Shafferi Meek.

1882. Arthropora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, pp. 152, 167.
1889. Arthropora. Miller, North American Geol. Pal., p. 293.
1890. Arthropora. Ulrich, Geol. Surv. Illinois, VIII, p. 393.
1893. Arthropora. Ulrich, Geol. Minnesota, III, p. 176.
1896. Arthropora. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 279.
1897. Arthropora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 605.

Arthropora bifurcata Ulrich.

1893. Arthropora bifurcata. Ulrich, Geol. Minnesota, III, p. 178, pl. xiv, 22–25.
Trenton (Black River): St. Paul and Cannon Falls, Minnesota.

Arthropora reversa Ulrich.

1893. Arthropora reversa. Ulrich, Geol. Minnesota, III, p. 178, pl. xiv, 26.
Trenton: St. Paul, Minnesota.

Arthropora shafferi (Meek).

1872. Ptilodictya (Stictopora) Shafferi. Meek, Proc. Acad. Nat. Sci. Philadelphia, p. 317.
1873. Ptilodictya (Stictopora) Shafferi. Meek, Pal. Ohio, I, p. 69, pl. v. 1*a–c*.
1875. Ptilodictya Shafferi. Nicholson, Pal. Province Ontario, p. 33, fig. 4.
1882. Arthropora shafferi. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 167, pl. vii, 10, 10*a*.
1889. Arthropora shafferi. Miller, North American Geol. Pal., figs. 453–455 (p. 293).
1890. Arthropora shafferi. Ulrich, Geol. Surv. Illinois, VIII, fig. 3*e* (p. 308).
1879. Crateripora erecta. Ulrich, Jour. Cincinnati Soc. Nat. Hist., II, p. 29, pl. vii, 29, 29*a*.
1879. Stromatopora (?) lichenoides. James, Paleontologist, No. 3, p. 18.

Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.

Obs. The names Crateripora erecta Ulrich and Stromatopora (?) lichenoides James were applied to the articulating basal socket of this species before its true nature was understood.

Arthropora shafferi-cleavelandi (James).

1881. Ptilodictya cleavelandi. James, Paleontologist, No. 5, p. 38.
1881. Ptilodictya? cincinnatiensis. James, Paleontologist, No. 5, p. 39.
1881. Ptilodictya grahami. James, Paleontologist, No. 5, p. 39.
1881. Ptilodictya dubia. James, Paleontologist, No. 5, p. 40.

Cincinnati (Utica): Cincinnati, Ohio, and vicinity.

Arthropora simplex Ulrich.

1886. Arthropora simplex. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Surv. Minnesota, p. 65.
1893. Arthropora simplex. Ulrich, Geol. Minnesota, III, p. 177, pl. xiv, 12–21.

Trenton (Stones River and Black River): Minneapolis, St. Paul, and Fountain, Minnesota; Decorah, Iowa.

ARTHROSTYLUS Ulrich. Genotype: Helopora tenuis James.

1882. Arthronema (preoccupied). Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, pp. 151, 160.
1888. Arthrostylus. Ulrich, American Geologist, I, p. 230.
1889. Arthrostylus. Miller, North American Geol. Pal., p. 293.
1890. Arthrostylus. Ulrich, Jour. Cincinnati Soc. Nat. Hist., XII, p. 188.
1890. Arthrostylus. Ulrich, Geol. Surv. Illinois, VIII, p. 400.
1893. Arthrostylus. Ulrich, Geol. Minnesota, III, p. 187.
1896. Arthrostylus. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 280.
1897. Arthrostylus. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 527.

Arthrostylus conjunctus Ulrich.

1890. Arthrostylus conjunctus. Ulrich, Jour. Cincinnati Soc. Nat. Hist., XII, p. 189, fig. 14.
1893. Arthrostylus conjunctus. Ulrich, Geol. Minnesota, III, p. 188, pl. iii, 13, 14.
1897. Arthrostylus conjunctus. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 78, 79, 79*a* (p. 526).

Trenton (Black River): Fountain, Minnesota.

Arthrostylus curtus (Ulrich).

1882. Arthronema curtum. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 161, pl. vi, 9.
1889. Arthrostylus curtus. Miller, North American Geol. Pal., p. 293.

Cincinnati (Utica): Covington, Kentucky.

Obs. This may be a basal segment of some species of Arthropora.

Arthrostylus obliquus Ulrich.

1890. Arthrostylus obliquus. Ulrich, Jour. Cincinnati Soc. Nat. Hist., XII, p. 190, figs. 14*c*, *d*.

1893. Arthrostylus obliquus. Ulrich, Geol. Minnesota, III, p. 188, pl. iii, 15, 16.

Trenton (Stones River): Minneapolis, Minnesota.

Arthrostylus tenuis (James).

1878. Helopora tenuis. James, Paleontologist No. 1, p. 3.

1882. Arthronema tenuis. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 160, pl. vi, 8–8*c*.

1893. Arthrostylus tenuis. Ulrich, Geol. Minnesota, III, pl. iii, 16*e*.

Trenton: Covington, Kentucky.

Cincinnati (Utica): Covington and Newport, Kentucky; Cincinnati, Ohio.

ASCODICTYON Nicholson and Etheridge, Jun. Genotype: Ascodictyon stellatum Nicholson and Etheridge, Jun.

1877. Ascodictyon. Nicholson and Etheridge, Jun., Ann. Mag. Nat. Hist., ser. 4, XIX, p. 463.

1882. Ascodictyon. Vine, Quar. Jour. Geol. Soc. London, XXXVIII, p. 52.

1889. Ascodictyon. Miller, North American Geol. Pal., p. 293.

1890. Ascodictyon. Ulrich, Geol. Surv. Illinois, VIII, p. 367.

1897. Ascodictyon. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 603.

Obs. Ascodictyon fusiforme was the first species described, but, judging from the generic description, the authors intended A. stellatum to be the genotype.

Ascodictyon fusiforme Nicholson and Etheridge, Jun.

1877. Ascodictyon fusiforme, Nicholson and Etheridge, Jun., Ann. Mag. Nat. Hist., ser. 4, XIX, p. 463, pl. xix, 7, 8.

Hamilton: Widder, Ontario; Alpena, Michigan.

Ascodictyon stellatum Nicholson and Etheridge, Jun.

1877. Ascodictyon stellatum. Nicholson and Etheridge, Jun., Ann. Mag. Nat. Hist., ser. 4, XIX, p. 464, pl. xix, 1–6.

1881. Ascodictyon stellatum. Vine, Quar. Jour. Geol. Soc. London, XXXVII, p. 618.

1891. Ascodictyon stellatum. Whiteaves, Contr. Canadian Pal., I, p. 213.

1893. Ascodictyon stellatum. Ulrich, Geol. Minnesota, III, p. 113, fig. 8*a*.

1897. Ascodictyon stellatum. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 220 (p. 603).

Hamilton: Widder, Ontario; Eighteenmile Creek, New York.

ASPIDOPORA Ulrich. Genotype: Aspidopora areolata Ulrich.

1882. Aspidopora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 155.

1889. Aspidopora. Miller, North American Geol. Pal., p. 293.

1890. Aspidopora. Ulrich, Geol. Surv. Illinois, VIII, p. 373.

1893. Aspidopora. Ulrich, Geol. Minnesota, III, p. 254.

1897. Aspidopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 584.

Aspidopora areolata Ulrich.

1883. Aspidopora areolata. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 164, pl. vii, 2–2*c*.

1894. Monticulipora areolata. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 183.

Cincinnati (Utica): Cincinnati, Ohio.

Aspidopora calycula (James).

1871. Lichenalia? calycula. James, Catal. Foss. Cincinnati Group. (Not defined.)
1875. Chætetes? calyculus. James, Introd. Catal. Foss. Cincinnati Group, p. 1.
1881. Monticulipora (Diplotrypa) calycula. Nicholson, Genus Monticulipora, p. 165, pl. iv, 4–4*b*.
1883. Prasopora calycula. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 165.
1888. Monticulipora calycula. James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 167.
1894. Monticulipora calycula. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 184.
Trenton: Covington, Kentucky.

Aspidopora eccentrica (James).

1882. Monticulipora (Heterotrypa?) eccentrica. James, Paleontologist, No. 6, p. 48; ibid., No. 7, pl. i, 6, 6*a*.
1888. Monticulipora eccentrica. James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 167, pl. ii, 2*a*–*c*.
1893. Aspidopora eccentrica. Ulrich, Geol. Minnesota, III, p. 255.
1894. Monticulipora eccentrica. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI. p. 185.
Cincinnati (Utica): Cincinnati, Ohio, and vicinity.

Aspidopora elegantula (Ulrich).

1893. Aspidopora elegantula. Ulrich, Geol. Minnesota, III, p. 256, pl. xvii, 13–21.
1897. Aspidopora elegantula. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 162–164 (p. 584).
Trenton: Kenyon and St. Paul, Minnesota.

Aspidopora newberryi (Nicholson).

1875. Chætetes Newberryi. Nicholson, Pal. Ohio, II, p. 212, pl. xxii, 4, 4*a*.
1881. Monticulipora (Prasopora) Newberryi. Nicholson, Genus Monticulipora, p. 212, pl. iv, 1–1*e*.
1883. Prasopora ? newberryi. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 165.
1886. Aspidopora newberryi. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Surv. Minnesota, p. 91.
1888. Monticulipora newberryi. James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 164.
1894. Monticulipora newberryi. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 179.
Cincinnati (Utica): Cincinnati, Ohio, and vicinity.

Aspidopora parasitica (Ulrich).

1886. Aspidopora parasitica (in part). Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Surv. Minnesota, p. 90.
1893. Aspidopora parasitica. Ulrich, Geol. Minnesota, III, p. 255, pl. xvii, 26–32.
1894. Aspidopora parasitica. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 180.
Trenton (Stones River and Black River): Minneapolis, St. Paul, and Fountain, Minnesota.

Aspidopora parmula (Foerste).

1887. Prasopora parmula. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 170; ibid., III, 1888, pl. xv, 14.
1895. Aspidopora parmula. Foerste, Geol. Surv. Ohio, VII, p. 600, pl. xxviii, 14.
Clinton: Dayton and Clinton County, Ohio.

Aspidopora parmula-fenestelliformis Foerste.

1895. Aspidopora parmula var. fenestelliformis. Foerste, Geol. Surv. Ohio, VII, p. 600.

Clinton: Dayton, Ohio.

Astroporites Lambe. Genotype: Astroporites ottawaensis Lambe.

1896. Astroporites. Lambe, Canadian Record of Science, VII, p. 1.

Obs.—This genus is founded upon the basal plate of a Lichenocrinoid. Mr. Ulrich, who pointed out this fact to us, has specimens which clearly indicate the nature of this fossil.

Astroporites ottawaensis Lambe. Not a bryozoan.

1896. Astroporites Ottawaensis. Lambe, Canadian Record of Science, VII, p. 1, pl. i, 1–3.

Trenton: Hull, near Ottawa, Canada.

ATACTOPORA Ulrich. Genotype: Atactopora hirsuta Ulrich.

1879. Atactopora (in part). Ulrich, Jour. Cincinnati Soc. Nat. Hist., II, p. 119.
1882. Atactopora (in part). Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 154.
1883. Atactopora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 245.
1889. Atactopora. Miller, North American Geol. Pal., p. 293.
1890. Atactopora. Ulrich, Geol. Surv. Illinois, VIII, p. 377.
1896. Atactopora. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 278.
1897. Atactopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 563.

Atactopora hirsuta Ulrich.

1879. Atactopora hirsuta. Ulrich, Jour. Cincinnati Soc. Nat. Hist., II, p. 120, pl. xii, 3–3*b*.
1883. Atactopora hirsuta. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 245, pl. xii, 1, 1*a*.

Cincinnati (Utica and Lorraine): Covington and Newport, Kentucky; Cincinnati, Ohio.

Atactopora maculata Ulrich.

1879. Atactopora maculata. Ulrich, Jour. Cincinnati Soc. Nat. Hist., II, p. 121, pl. xii, 2–2*e*.
1883. Atactopora maculata. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI., p. 245, pl. xii, 2, 2*a*.
1896. Atactopora maculata. Ulrich, Zittel's Textb. Pal. (Engl. ed.), fig. 466 (p. 278).

Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.

Atactopora multigranosa Ulrich. See Atactoporella multigranosa (Ulrich).

Atactopora mundula Ulrich. See Atactoporella mundula (Ulrich).

Atactopora septosa Ulrich. See Amplexopora septosa (Ulrich).

Atactopora subramosa Ulrich. See Heterotrypa subramosa (Ulrich).

Atactopora tenella Ulrich. See Atactoporella tenella (Ulrich).

ATACTOPORELLA Ulrich. Genotype: Atactoporella typicalis Ulrich.

1879. Atactopora (in part). Ulrich, Jour. Cincinnati Soc. Nat. Hist., II, p. 119.
1881. Peronopora (in part). Nicholson, Genus Monticulipora, p. 215.
1883. Atactoporella. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 247.
1889. Atactoporella. Miller, North American Geol. Pal., p. 293.
1890. Atactoporella. Ulrich, Geol. Surv. Illinois, VIII, p. 370.
1893. Atactoporella. Ulrich, Geol. Minnesota, III, p. 222.

ATACTOPORELLA Ulrich—Continued.

1896. Atactoporella. Ulrich, Zittel's Textb. Pal. (Engl. ed,), p. 272.
1897. Atactoporella. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 585.

Atactoporella? crassa Ulrich.

1893. Atactoporella crassa. Ulrich, Geol. Minnesota, III, p. 225, pl. xv, 18–21.
Trenton: St. Paul and Cannon Falls, Minnesota.

Atactoporella insueta Ulrich.

1893. Atactoporella insueta. Ulrich, Geol. Minnesota, III, p. 224, pl. xv, 13–15, pl. xviii, 5–8.
Trenton (Black River): Minneapolis, St. Paul, and Fountain, Minnesota.

Atactoporella multigranosa (Ulrich).

1879. Atactopora multigranosa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., II, p. 122, pl. xii, 1, 1*a*.
1883. Atactoporella multigranosa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 254, pl. xii, 8, 8*a*.
1895. Atactoporella multigranosa. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 80.
Cincinnati (Lorraine): Hamilton, Morrow, and Cincinnati, Ohio.

Atactoporella mundula (Ulrich).

1879. Atactopora mundula. Ulrich, Jour. Cincinnati Soc. Nat. Hist., II, p. 123, pl. xii, 4, 4*a*.
1883. Atactoporella mundula. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 252, pl. xii, 6, 6*a*.
1895. Atactoporella mundula. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 80.
Cincinnati (Lorraine): Covington and Newport, Kentucky; Cincinnati, Ohio.

Atactoporella newportensis Ulrich.

1883. Atactoporella newportensis. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 250, pl. xii, 4–4b.
1888. Monticulipora newportensis. James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 183.
1889. Atactoporella newportensis. Miller, North American Geol. Pal., fig. 456 (p. 294).
1894. Monticulipora newportensis. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 206.
Cincinnati (Utica): Newport, Kentucky.

Atactoporella ortoni (Nicholson).

1874. Chætetes Ortoni. Nicholson, Quar. Jour. Geol. Soc. London, XXX, p. 513, pl. xxix, 15–15*b*.
1875. Chætetes Ortoni. Nicholson, Pal. Ohio, II, p. 211, pl. xxii, 3–3*b*.
1881. Monticulipora (Peronopora?) Ortoni. Nicholson, Genus Monticulipora, p. 228, pl. iii, 4–4*d*.
1883. Atactoporella ortoni. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 256, pl. xii, 7, 7*a*.
1888. Monticulipora ortoni. James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 22.
1895. Monticulipora ortoni. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 79.
Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.

Atactoporella ramosa Ulrich.

1893. Atactoporella ramosa. Ulrich, Geol. Minnesota, III, p. 226, pl. xx, 22–27.
Trenton (Black River): Cannon Falls, Minnesota.

Atactoporella schucherti Ulrich.

1883. Atactoporella schucherti. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 251, pl. xii, 5–5*b*.
1895. Atactoporella schucherti. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 80.
Cincinnati (Richmond): Oxford, Waynesville, and Oregonia, Ohio; Richmond and Versailles, Indiana.

Atactoporella tenella (Ulrich).

1879. Atactopora tenella. Ulrich, Jour. Cincinnati Soc. Nat. Hist., II, p. 123, pl. xii, 5, 5*a*.
1883. Atactoporella tenella. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 246.
1895. Atactoporella tenella. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 80.
Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.

Atactoporella typicalis Ulrich.

1883. Atactoporella typicalis. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 248, pl. xii, 3–3*d*.
1895. Atactoporella typicalis. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 80.
1896. Atactoporella typicalis. Ulrich, Zittel's Textb. Pal. (Engl. ed.), fig. 450, (p. 272).
1897. Atactoporella typicalis. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 165–167 (p. 585).
Cincinnati (Utica): Covington and Newport, Kentucky; Cincinnati, Ohio.

Atactoporella typicalis-præcipta Ulrich.

1893. Atactoporella typicalis var. præcipta. Ulrich, Geol. Minnesota, III, p. 223, pl. xv, 16, 17, pl. xviii, 1–4.
Trenton (Black River): Minneapolis, St. Paul, and Fountain, Minnesota.

Aulopora Goldfuss. Considered at present a genus of corals.

Aulopora arachnoidea Hall. See Stomatopora arachnoidea (Hall).

Aulopora ? Canadensis Nicholson. See Hederella canadensis (Nicholson).

Aulopora filiformis Billings. See Hederella filiformis (Billings).

Aulopora frondosa James. See Proboscina frondosa (Nicholson).

BACTROPORA Hall and Simpson. Genotype: Trematopora ? granistriata Hall.

1887. Bactropora. Hall and Simpson, Pal. New York, VI, p. xv.
1889. Bactropora. Miller, North American Geol. Pal., p. 294.
1890. Bactropora. Ulrich, Geol. Surv. Illinois, VIII, pp. 402, 662.
1896. Bactropora. Ulrich, Zittel's Texb. Pal., (Engl. ed.), p. 281.
1897. Bactropora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 553.

Bactropora curvata Hall and Simpson.

1887. Bactropora curvata. Hall and Simpson, Pal. New York, VI, p. 194, pl. xvi, 14–16.
1897. Bactropora curvata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xvi, 13, 14.
Hamilton: Canandaigua Lake, New York.

Bactropora granistriata (Hall).

1883. Trematopora ? granistriata. Hall, Trans. Albany Institute, X, p. 182 (abstract, 1881, p. 182).

1884. Trematopora ? granistriata. Hall, Rep. State Geologist New York for the year 1883, p. 13.

1887. Bactropora granistriata. Hall and Simpson, Pal. New York, VI, p. 193, pl. lxvi, 20–22.

Hamilton: Darien Center, New York

Bactropora simplex Ulrich.

1890. Bactropora simplex. Ulrich, Geol. Surv. Illinois, VIII, p. 663, pl. lxx, 14–14*b*, pl. lxxi, 6, 6*a*.

1894. Bactropora simplex. Keyes, Missouri Geol. Surv., V, p. 35.

Keokuk: Keokuk, Iowa; Nauvoo and Warsaw, Illinois; Clark County, Missouri.

BATOSTOMA Ulrich. Genotype: Monticulipora (Heterotrypa) implicata Nicholson.

1882. Batostoma. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 154.

1883. Batostoma. Foord, Contr. Micro-Pal. Cambro-Sil., p. 17.

1889. Batostoma. Miller, North American Geol. Pal., p. 294.

1890. Batostoma. Ulrich, Geol. Surv. Illinois, VIII, pp. 379, 459.

1893. Batostoma. Ulrich, Geol. Minnesota, III, p. 288.

1896. Batostoma. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 275.

1897. Batostoma. Simpson, Fourteenth Ann. Rep. State Geologist, New York, for the year 1894, p. 588.

Batostoma canadense (Foord).

1883. Amplexopora Canadensis. Foord, Contr. Micro-Pal. Cambro-Sil., p. 17, pl. iv, 2–2*d*.

1893. Batostoma Canadensis. Ulrich, Geol. Minnesota, III, p. 317.

Trenton (Black River): St. Joseph Island, Lake Huron.

Trenton: Joliette, Quebec.

Batostoma ? decipiens Ulrich.

1893. Batostoma ? decipiens. Ulrich, Geol. Minnesota, III, p. 298, pl. xxvii, 16–19.

Trenton (Stones River and Black River): Minneapolis, Minnesota.

Batostoma fertile Ulrich.

1886. Batostoma fertilis. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Surv. Minnesota, p. 92.

1893. Batostoma fertile. Ulrich, Geol. Minnesota, III, p. 290, pl. xxv, 1–11.

1896. Batostoma fertile. Ulrich, Zittel's Textb. Pal. (Engl. ed.), fig. 459 A (p. 275).

Trenton (Stones River): Minneapolis and St. Paul, Minnesota.

Batostoma fertile-circulare Ulrich.

1893. Batostoma fertile var. circulare. Ulrich, Geol. Minnesota, III, p. 291, pl. xxv, 8, 9.

1896. Batostoma fertile. Ulrich, Zittel's Textb. Pal. (Engl. ed.), fig. 459 B (p. 275).

Trenton (Stones River): Minneapolis and St. Paul, Minnesota.

Batostoma humile Ulrich.

1893. Batostoma humile. Ulrich, Geol. Minnesota, III, p. 294, pl. xxv, 29–36.

Trenton: St. Paul and Cannon Falls, Minnesota; Decorah, Iowa.

Batostoma imperfectum Ulrich. See Hemiphragma imperfectum (Ulrich).

Batostoma implicatum (Nicholson).

1880. Chætetes implicata. Ulrich, Catal. Foss. Cincinnati Group, p. 12. (Not defined.)
1881. Monticulipora (Heterotrypa) implicata. Nicholson, Genus Monticulipora, p. 147, pl. ii, 7-7*e*.
1882. Batostoma implicatum. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 256.
1894. Monticulipora implicatum. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 198.
1875. Alecto nexilis. James, Intr. Catal. Foss. Cincinnati Group, p. 3.
1878. Ceramopora ? irregularis, James, Paleontologist, No. 1, p. 5.
Cincinnati (Utica): Cincinnati, Ohio, and vicinity.
Obs. Alecto nexilis James was founded upon specimens of this species showing the large perforated acanthopores which Mr. James mistook for the cell apertures of his species.

Batostoma irrasa Ulrich. See Hemiphragma irrasum (Ulrich).

Batostoma jamesi (Nicholson).

1874. Chætetes Jamesi. Nicholson, Quar. Jour. Geol. Soc. London, XXX, p. 506, pl. xxix, 10-10*b*.
1875. Chætetes Jamesi. Nicholson, Pal. Ohio, II, p. 200, pl. xxi, 11, 11*a*.
1876. Chætetes Jamesi. Nicholson, Ann. Mag. Nat. Hist., ser. 4, XVIII, p. 89, pl. v, 5.
1880. Monticulipora Jamesi. Nicholson, Ann. Mag. Nat. Hist., ser. 5, VI, p. 415, fig. 3A, B, fig. 4.
1881. Monticulipora (Heterotrypa) Jamesi. Nicholson, Genus Monticulipora, p. 143, figs. 25, 26.
1882. Batostoma jamesi. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 256; ibid., VI, 1883, p. 83.
1883. Monticulipora Jamesi. (Van Cleve), Hall, Twelfth Ann. Rep. Indiana Geol. Nat. Hist., p. 248, pl. xi, 8.
1888. Monticulipora jamesi. James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 176.
1889. Batostoma jamesi. Miller, North American Geol. Pal., fig. 457 (p. 294).
1894. Monticulipora jamesi. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 197.
Cincinnati (Utica): Cincinnati, Ohio, and vicinity.

Batostoma magnoporum Ulrich.

1893. Batostoma magnopora. Ulrich, Geol. Minnesota, III, p. 291, pl. xxv, 12-15.
Trenton (Black River): Minneapolis and St. Paul, Minnesota.

Batostoma manitobense Ulrich.

1889. Batostoma Manitobense. Ulrich, Contr. Micro-Pal. Cambro-Sil., Part II, p. 33, pl. ix, 3-3*c*.
1895. Batostoma Manitobense. Whiteaves, Paleozoic Foss., III, p. 117.
Cincinnati (Richmond): Stony Mountain, Manitoba.

Batostoma minnesotense Ulrich.

1886. Amplexopora superba (not of Foord). Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Surv. Minnesota, p. 92.
1893. Batostoma minnesotense. Ulrich, Geol. Minnesota, III, p. 297, pl. xxvi, 38-40, pl. xxvii, 9-15.

Batostoma minnesotense Ulrich—Continued.

1897. Batostoma Minnesotense. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 173 (p. 588).
Trenton (Black River): Minneapolis and St. Paul, Minnesota.

Batostoma montuosum Ulrich.

1893. Batostoma montuosum. Ulrich, Geol. Minnesota, III, p. 293, pl. xxv, 26–28.
Trenton (Black River): Cannon Falls, Minnesota.

Batostoma Ottawaense Foord. See Hemiphragma ottawense (Foord).

Batostoma ? rugosum (Whitfield).

1880. Fistulipora rugosa. Whitfield, Ann. Rep. Wisconsin Geol. Surv. for the year 1879, p. 60.
1882. Fistulipora rugosa. Whitfield, Geol. Surv. Wisconsin, IV, p. 255, pl. xi, 20, 21.
1889. Batostoma rugosum. Miller, North American Geol. Pal., p. 294.
Cincinnati (Richmond): Delafield, Wisconsin.

Batostoma superbum (Foord).

1883. Amplexopora superba. Foord, Contr. Micro-Pal. Cambro-Sil., p. 16, pl. iv, 1–1c.
1893. Batostoma superbum. Ulrich, Geol. Minnesota, III, p. 297.
Trenton: Montreal, Canada.

Batostoma variabile Ulrich. See Batostoma varians (James).

Batostoma varians (James).

1878. Chætetes varians. James, Paleontologist, No. 1, p. 2.
1881. Monticulipora (Chætetes) varians. James, Paleontologist, No. 5, p. 36.
1888. Monticulipora varians. James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 177, pl. ii, 4 *a*, *b*.
1894. Monticulipora varians. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 199.
1890. Batostoma variabile. Ulrich, Geol. Surv. Illinois, VIII, p. 460, pl. xxxv, 4–4*e*, 5 (not 5*a*), pl. xxxvi, 1.
1894. Batostoma variabile. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 200.
Cincinnati (Richmond): Blanchester, Clarksville, and other localities in Ohio; Richmond and Versailles, Indiana; Savannah, Illinois; Delafield, Wisconsin.

Batostoma varium Ulrich.

1893. Batostoma varium. Ulrich, Geol. Minnesota, III, p. 292, pl. xxv, 16–25.
1897. Batostoma varium. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 175 (p. 588) (not fig. 176=Eridotrypa mutabilis Ulrich).
Trenton (Black River): Minneapolis and St. Paul, Minnesota.

Batostoma winchelli (Ulrich).

1886. Amplexopora winchelli. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Surv. Minnesota, p. 91.
1893. Batostoma winchelli. Ulrich, Geol. Minnesota, III, p. 295, pl. xxvi, 33–37, pl. xxvii, 1–6.
1897. Batostoma Winchelli, Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 174 (p. 588).
Trenton (Black River): St. Paul and Minneapolis, Minnesota: Goodhue and Fillmore counties, Minnesota.

Batostoma winchelli-nodosum Ulrich.

1893. Batostoma winchelli var. nodosa. Ulrich, Geol. Minnesota, III, p. 295, pl. xxvi, 35.

Trenton (Black River): Minneapolis and St. Paul, Minnesota.

Batostoma winchelli-spinulosum Ulrich.

1893. Batostoma winchelli var. spinulosum. Ulrich, Geol. Minnesota, III, p. 296, pl. xxvii, 7, 8.

1896. Batostoma winchelli var. spinulosum. Ulrich, Zittel's Textb. Pal. (Engl. ed.), fig. 459 C (p. 275).

Trenton (Black River): Minneapolis and St. Paul, Minnesota.

BATOSTOMELLA Ulrich. Genotype: **Batostomella spinulosa Ulrich.**

1882. Batostomella (in part). Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, pp. 141, 154.

1889. Batostomella. Miller, North American Geol. Pal., p. 294.

1890. Batostomella (in part). Ulrich, Geol. Surv. Illinois, VIII, pp. 375, 432.

1895. Batostomella. Whidborne, Devon. Fauna England (Pal. Soc. Publ.), II, pt. 4, p. 187.

1896. Batostomella. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 277.

1886. Geinitzella. Waagen and Wentzel, Pal. Indica, Ser. XIII, pp. 875, 880.

1896. Geinitzella. Zittel, Textb. Pal. (Engl. ed.), p. 105.

Batostomella abrupta Ulrich.

1890. Batostomella abrupta. Ulrich, Geol. Surv. Illinois, VIII, p. 435, pl. lxxv, 2–2*e*.

Chester: Sloans Valley, Kentucky.

Batostomella annulata Ulrich. See Trematella annulata (Hall).

Batostomella annulifera Ulrich. See Lioclemella annulifera (Whitfield).

Batostomella? aspera (Hall).

1852. Trematopora aspera. Hall, Pal. New York, II, p. 154, pl. xl A, 10*a*–*c*.

Niagara: Lockport, New York.

Batostomella gracilis Ulrich. See Bythopora gracilis (Nicholson).

Batostomella granulifera (Hall).

1852. Trematopora granulifera. Hall, Pal. New York, II, p. 154, pl. xl A, 9*a*–*e*.

*1876. Trematopora granulifera. Hall, Twenty-eighth Ann. Rep. New York State Museum (documentary edition), pl. xi, 6, 7; ibid. (Museum edition, 1879), p. 112, pl. xi, 6, 7.

*1882. Trematopora granulifera. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 233, pl. x, 6, 7.

1890. Rhombopora granulifera. Ulrich, Geol. Surv. Illinois, VIII, p. 647.

Niagara: Lockport, New York; Waldron, Indiana.

Obs. The citations preceded by the (*) refer to the Waldron form, which may be specifically distinct.

Batostomella granulifera Ulrich. See Homotrypella granulifera (Ulrich).

Batostomella interstincta Ulrich.

1890. Batostomella interstincta. Ulrich, Geol. Surv. Illinois, VIII, p. 434, pl. lxxv, 4–4*e*.

Ste. Genevieve: Pella, Iowa.

Batostomella nitidula Ulrich.

1890. Batostomella nitidula. Ulrich, Geol. Surv. Illinois, VIII, p. 436, pl. lxxv. 3-3*b*.

1894. Batostomella nitidula. Keyes, Missouri Geol. Surv., V, p. 14.

Chester: Chester, Illinois; Sloans Valley, Kentucky.

Batostomella obliqua Ulrich. See Eridotrypa ? obliqua (Ulrich).

Batostomella perspinulata Ulrich. See Trematella perspinulata (Hall).

Batostomella simulatrix Ulrich. See Eridotrypa simulatrix (Ulrich).

Batostomella spinulosa Ulrich.

1890. Batostomella spinulosa. Ulrich, Geol. Surv. Illinois, VIII, p. 434, pl. lxxv, 1-1*f*.

1896. Batostomella spinulosa. Ulrich, Zittel's Textb. Pal. (Engl. ed.), fig. 463 (p. 277).

Chester: Sloans Valley, Kentucky; Chester, Illinois.

BERENICEA Lamouroux. Genotype: Berenicea diluviana Lamouroux.

1821. Berenicea (in part). Lamouroux, Expos. Meth. des Genres d. Pol., p. 80

1852. Berenicea. McCoy, Brit. Pal. Foss., p. 44.

1854. Berenicea. D'Orbigny, Pal. Franc. Terr. Cret., V, p. 858.

1854. Berenicea. Haime, Bry. de la Form. Juras., p. 175.

1882. Berenicea. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 149.

1889. Berenicea. Miller, North American Geol. Pal., p. 294.

1890. Berenicea. Ulrich, Geol. Surv. Illinois, VIII, p. 368.

1893. Berenicea. Ulrich, Geol. Minnesota, III, p. 120.

1896. Berenicea. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 261.

1897. Berenicea. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 594.

1840. Rosacilla. F. A. Roemer, Verst. des Norddeutsh. Kreidegeb., p. 19.

Diastopora (not of Lamouroux). D'Orbigny, Busk, and other English authors.

Diastopora (in part). Hincks, Vine, and other authors.

1852. Sagenella. Hall, Pal. New York, II, p. 172.

1889. Sagenella. Miller, North American Geol. Pal., p. 321.

1897. Sagenella. Simpson, Fourteenth Ann. Rept. State Geologist New York for the year 1894, p. 597.

1883. Diastoporella. Vine, Rep. British Ass. Adv. Sci., LII, p. 275.

1887. Diastoporella. Vine, Proc. Yorkshire Geol. Polyt. Soc., IX, p. 190.

Berenicea elegans (Hall).

1876. Sagenella elegans. Hall, Twenty-eighth Ann. Rep. New York State Museum (documentary edition), pl. vii, 12, 13; ibid. (Museum edition, 1879), p. 118, pl. vii, 12, 13.

1882. Sagenella elegans. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 242, pl. vi, 12, 13.

1897. Sagenella elegans. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xx, 4.

Niagara: Waldron, Indiana.

Berenicea ? insueta Dawson.

1883. Berenicea insueta. Dawson, Rep. on Peter Redpath Museum, No. 2, p. 12.

Subcarboniferous: Windsor, Nova Scotia.

Berenicea membranacea (Hall).

1852. Sagenella membranacea. Hall, Pal. New York, II, p. 172, pl. xlE, 6 *a*, *b*.

Niagara: Lockport and Rochester, New York.

Berenicea minnesotensis Ulrich.

1886. Berenicea minnesotensis. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Surv. Minnesota, p. 58.
1893. Berenicea minnesotensis. Ulrich, Geol. Minnesota, III, p. 120, pl. i, 25, 27, 29, pl. ii, 1.
1897. Berenicea Minnesotensis. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 197, 198 (p. 595).
Trenton (Stones River and Black River): Minneapolis and St. Paul, Minnesota.

Berenicea primitiva Ulrich.

1882. Berenicea primitiva. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 157, pl. vi, 4.
Cincinnati (Lorraine and Richmond): Cincinnati, Waynesville, Lebanon, Clarksville, and other localities in Ohio; Richmond and Versailles, Indiana.

Berenicea vesiculosa Ulrich.

1882. Berenicea vesiculosa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 158, pl. vi, 5.
Cincinnati (Utica): Cincinnati, Ohio, and vicinity.

BOTRYLLOPORA Nicholson. Genotype: Botryllopora socialis Nicholson.

1874. Botryllopora. Nicholson, Canad. Jour., XIV, p. 133.
1874. Botryllopora. Nicholson, Geol. Mag., new ser., I, p. 159.
1874. Botryllopora. Nicholson, Pal. Province Ontario, p. 96.
1887. Botryllopora. Hall and Simpson, Pal. New York, VI, p. xxvi.
1889. Botryllopora. Miller, North American Geol. Pal., p. 294.
1890. Botryllopora. Ulrich, Geol. Surv. Illinois, VIII, p. 384.
1897. Botryllopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 592.
1899. Botryllopora. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 177.

Botryllopora socialis Nicholson.

1874. Botryllopora socialis. Nicholson, Geol. Mag., new ser., I, p. 160, pl. ix, 16.
1874. Botryllopora socialis. Nicholson, Pal. Province Ontario, p. 96, fig. 32.
1884. Botryllopora socialis. Hall, Rep. State Geologist New York for the year 1883, p. 61.
1887. Botryllopora socialis. Hall and Simpson, Pal. New York, VI, p. 282, pl. lxiv, 3, 4.
1889. Botryllopora socialis. Miller, North American Geol. Pal., fig. 459 (p. 295).
1890. Botryllopora socialis. Ulrich, Geol. Surv. Illinois, VIII, p. 490, pl. xliii, 9–9 *b*.
1897. Botryllopora socialis. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xx, 16, 17.
1899. Botryllopora socialis. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 177, fig. 75.
Hamilton: Arkona and West Williams, Ontario, Canada; Eighteenmile Creek, New York; near Alpena, Michigan; Falls of the Ohio.
Obs. See also Fistulipora helios Rominger.

BUSKOPORA Ulrich. Genotype: Buskopora dentata Ulrich.

1886. Buscopora. Ulrich, Contr. American Pal., I, p. 22.
1889. Buscopora. Miller, North American Geol. Pal., p. 295.
1890. Buskopora. Ulrich, Geol. Surv. Illinois, VIII, p. 383.
1896. Buskopora. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 270.

BUSKOPORA Ulrich—Continued.

1886. Odontotrypa. Hall, Rep. State Geologist New York for the year 1885, explanation sheet, pl. xxx.
1887. Odontotrypa. Hall and Simpson, Pal. New York, VI, pl. xvii.
1889. Odontotrypa. Miller, North American Geol. Pal., p. 313.
1897. Odontotrypa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 561.
Obs. See also remarks under Glossotrypa Hall.

Buskopora bistriata (Hall).

1883. Lichenalia bistriata. Hall, Trans. Albany Institute, X, p. 150 (abstract, 1881, p. 8).
1886. Lichenalia bistriata. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxxii, 6–14.
1887. Lichenalia bistriata. Hall and Simpson, Pal. New York, VI, p. 79, pl. xxxii, 6–14.
1897. Pileotrypa bistriata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxiii, 14.
1883. Lichenalia alveata. Hall, Trans. Albany Institute, X, p. 152 (abstract, 1881, p. 10).
1886. Lichenalia (Odontotrypa) alveata. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxx, 24–27.
1887. Lichenalia (Odontotrypa) alveata. Hall and Simpson, Pal. New York, VI, p. 85, pl. xxx, 24–27.
1897. Odontotrypa alveata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxiv, 1–3.
Hamilton: Falls of the Ohio.

Buskopora dentata Ulrich.

1886. Buscopora dentata. Ulrich, Contr. American Pal., I, p. 22, pl. ii, 5, 5*a*.
1896. Buskopora dentata. Ulrich, Zittel's Textb. Pal. (Engl. ed.), fig. 446 (p. 270).
1883. Lichenalia lunata n. sp. (not Rominger's). Hall, Trans. Albany Institute, X, p. 152 (abstract, 1881, p. 10).
1886. Lichenalia lunata. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxxi, 1–9.
1887. Lichenalia lunata. Hall and Simpson, Pal. New York, VI, p. 77, pl. xxxi, 1–9.
1897. Lichenalia lunata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxiii, 5, 6
1889. Buskopora lunata. Miller, North American Geol. Pal., fig. 460 (p. 295).
1890. Buskopora lunata. Ulrich, Geol. Surv. Illinois, VIII, p. 489, pl. xlviii, 7–7*d*.
1886. Lichenalia lunata var. tubulata. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxxi, 28, 29.
1887. Lichenalia lunata var. tubulata. Hall and Simpson, Pal. New York, VI, p. 78, pl. xxxi, 28, 29.
1889. Buscopora lunata var. tubulata. Miller, North American Geol. Pal., p.295.
Hamilton: Falls of the Ohio.
Obs. Both Hall and Ulrich (in part) have regarded their species as synonyms for Rominger's Fistulipora lunata. It is very doubtful whether these forms are specifically the same as Rominger's; until such relationship is proved, we prefer to keep them distinct. But Hall's Lichenalia lunata and Ulrich's Buskopora dentata are the same form; as Hall's name is the same as Rominger's, it should be dropped in favor of Ulrich's name.

Buskopora lunata (Rominger).

1866. Fistulipora lunata. Rominger, Proc. Acad. Nat. Sci. Philadelphia, p. 120.
Upper Helderberg: Sandusky and Columbus, Ohio.

Buskopora lunata Ulrich. See Buskopora dentata Ulrich.

Buskopora lunata var. tubulata Miller. See Buskopora dentata Ulrich.

Buskopora pyriformis (Hall).

1883. Lichenalia pyriformis. Hall, Trans. Albany Institute, X, p. 154 (abstract, 1881, p. 12).
1886. Lichenalia (Pileotrypa) pyriformis. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxxi, 21–27.
1887. Lichenalia (Pileotrypa) pyriformis. Hall and Simpson, Pal. New York, VI, p. 82, pl. xxxi, 21–27.
1897. Pileotrypa pyriformis. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxiii, 9–11.
Hamilton: Falls of the Ohio.

BYTHOPORA Miller and Dyer. Genotype: Bythopora fruticosa Miller and Dyer = Helopora dendrina James.

1878. Bythopora. Miller and Dyer, Contr. to Pal., No. 2, p. 6.
1889. Bythopora. Miller, North American Geol. Pal., p. 295.
1890. Bythopora. Ulrich, Geol. Surv. Illinois, VIII, p. 376.
1893. Bythopora. Ulrich, Geol. Minnesota, III, p. 263.
1896. Bythopora. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 277.
1897. Bythopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 551.

Bythopora alcicornis Ulrich.

1893. Bythopora alcicornis. Ulrich, Geol. Minnesota, III, p. 264, pl. xxvi, 7–9.
1897. Bythopora alcicornis. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 121 (p. 551).
Trenton (Black River): Cannon Falls, Minnesota.

Bythopora arctipora (Nicholson).

1875. Ptilodictya ? arctipora. Nicholson, Ann. Mag. Nat. Hist., ser. 4, XV, p. 180, pl. xiv, 4–4*b*.
1875. Ptilodictya ? arctipora. Nicholson, Pal. Ohio, II, p. 262, pl. xxv, 9–9*b*.
1878. Bythopora arctipora. Miller and Dyer, Contr. to Pal., No. 2, p. 6.
Cincinnati (Utica): Cincinnati, Ohio, and vicinity.
Obs. See also Bythopora parvula (James).

Bythopora delicatula (Nicholson).

1874. Chætetes delicatulus. Nicholson, Quar. Jour. Geol. Soc. London, XXX, p. 505, pl. xxix, 8–8*b*.
1875. Chætetes delicatulus. Nicholson, Pal. Ohio, II, p. 199, pl. xxi, 9, 9*a*.
1875. Chætetes delicatulus. Nicholson, Pal. Province Ontario, p. 30.
1888. Monticulipora delicatula. James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 173.
1889. Bythopora ? delicatula. Ulrich, Contr. Micro-Pal. Cambro-Sil., Part II, p. 36.
1895. Bythopora delicatula. Whiteaves, Pal. Foss., III, p. 116.
1879. Chætetes minutus. James, Paleontologist, No. 3, p. 20. (See James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 173.)
Cincinnati (Richmond): Oxford, Waynesville, Lebanon, and other localities in Ohio; Richmond and Versailles, Indiana; Weston and Toronto, Ontario, Canada; Stony Mountain, Manitoba, Canada.

Bythopora dendrina (James).

1878. Helopora dendrina. James, Paleontologist, No. 1, p. 3, (July 2, 1878); ibid., No. 2, p. 14.
1878. Bythopora fruticosa. Miller and Dyer, Contr. to Pal., No. 2, p. 6, pl. iv, 6, 6*a*, (July 22, 1878).
1889. Bythopora fruticosa. Miller, North American Geol. Pal., fig. 461 (p. 295).
Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.

Bythopora fruticosa Miller and Dyer. See Bythopora dendrina (James).

Bythopora gracilis (Nicholson).

1871. Chætetes gracilis. James, Catal. Low. Sil. Foss. Cincinnati Group, p. 3. (Not defined).
1874. Chætetes gracilis. Nicholson, Quar. Jour. Geol. Soc. London, XXX, p. 504, pl. xxix, 7, 7*a*.
1875. Chætetes gracilis. Nicholson, Pal. Ohio, II, p. 198, pl xxi, 8–8*b*.
1875. Chætetes gracilis. Nicholson, Pal. Province Ontario, p. 11. (Same species ?)
1876. Chætetes gracilis. Nicholson, Ann. Mag. Nat. Hist., ser. 4, XXVIII, p. 90, pl. v, 13.
1881. Monticulipora (Heterotrypa) gracilis. Nicholson, Genus Monticulipora, p. 125, pl. ii, 1–1*b* and fig. 20.
1882. Batostomella gracilis. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 141; ibid., VI, 1883, p. 83.
1883. Monticulipora gracilis. (Van Cleve) Hall, Twelfth Ann. Rep. Indiana Geol. Nat. Hist., p. 248, pl. x, 1–3, pl. xi, 11.
1886. Batostomella gracilis. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Surv. Minnesota, p. 103.
1888. Monticulipora gracilis. James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 173.
1889. Batostomella gracilis. Ulrich, Contr. Micro-Pal. Cambro-Sil., Part II, p. 35.
1889. Batostomella gracilis. Miller, North American Geol. Pal., fig. 458 (p. 294).
1890. Batostomella gracilis. Ulrich, Geol. Surv. Illinois, VIII, p. 432, pl. xxxv, 2.
1893. Homotrypella gracilis. Ulrich, Geol. Minnesota, III, p. 228.
1894. Monticulipora gracilis. J. F. James, Jour. Cincinnati Soc. Nat. Hist, XVI, p. 191.
1895. Homotrypella gracilis. Whiteaves, Pal. Foss., III, p. 115.
1881. Chætetes læviramus. Quenstedt, Roehren- und Sternkorallen, p. 81, pl. cxlvi, 2*b*.
Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.

Bythopora herricki (Ulrich).

1886. Bythopora herricki. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Surv. Minnesota, p. 99.
1893. Bythopora herricki. Ulrich, Geol. Minnesota, III, p. 263, pl. xxvi, 1–6.
1897. Bythopora Herricki. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 120 (p. 551).
Trenton (Black River): St. Paul and Minneapolis, Minnesota.

Bythopora meeki (James).

1878. Chætetes meeki. James, Paleontologist, No. 1, p. 1.
1881. Monticulipora (Chætetes) meeki. James, Paleontologist, No. 5, p. 35.
1881. Monticulipora gracilis var. meeki. Nicholson, Genus Monticulipora, p. 127.
1888. Monticulipora meeki. James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 174.
1893. Homotrypella meeki. Ulrich, Geol. Minnesota, III, p. 228.

Bythopora meeki (James)—Continued.

1894. Monticulipora meeki. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 192.

Cincinnati (Richmond): Waynesville, Oxford, Lebanon, and other localities in Ohio; Richmond and Versailles, Indiana.

Bythopora nashvillensis Miller. See Rhinidictya nashvillensis (Miller.)

Bythopora parvula (James).

1878. Helopora parvula. James, Paleontologist, No. 1, p. 3.

1878. Helopora approximata. James, Paleontologist, No. 1, p. 3.

Cincinnati (Utica): Obanon Creek, Clermont County, Ohio.

Obs. This form may not be distinct from Bythopora arctipora (Nicholson).

Bythopora spinulosa (Hall).

1852. Trematopora spinulosa. Hall, Pal. New York, II, p. 155, pl. xlA, 11*a–c*.

Niagara: Lockport, New York.

Bythopora striata Ulrich.

1889. Bythopora striata. Ulrich, Contr. Micro-Pal. Cambro-Sil., Part II, p. 36.

1895. Bythopora striata. Whiteaves, Pal. Foss., III, p. 116.

Cincinnati (Richmond): Stony Mountain, Manitoba; Middletown and many other localities in Ohio.

BYTHOTRYPA Ulrich. Genotype: Fistulipora ? laxata Ulrich.

1893. Bythotrypa. Ulrich, Geol. Minnesota, III, p. 324.

1896. Bythotrypa. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 268.

Bythotrypa epidermata (Ulrich).

1890. Crepipora epidermata. Ulrich, Geol. Surv. Illinois, VIII, p. 471, pl. xl, 1–1*e*.

Cincinnati (Richmond): Wilmington and Savannah, Illinois.

Bythotrypa laxata (Ulrich).

1889. Fistulipora? laxata. Ulrich, Contr. Micro-Pal. Cambro-Sil., Part II, p. 37, pl. viii, 2, 2*a*.

1893. Bythotrypa laxata. Ulrich, Geol. Minnesota, III, p. 325, pl. xxviii, 21–25.

1896. Bythotrypa laxata. Ulrich, Zittel's Textb. Pal. (Engl. ed.), fig. 440 (p. 268).

1897. Bythotrypa laxata. Whiteaves, Pal. Foss., III, Part III, p. 163.

Trenton (Stones River, Black River, and Trenton): St. Andrews, Manitoba; Minneapolis, St. Paul, Kenyon, Berne, and Cannon Falls, Minnesota; Rockton, Illinois; Decorah, Iowa.

Callopora Dybowski (not Hall). See Diplotrypa Nicholson.

CALLOPORA Hall. (Not Callopora Gray, 1848.)[1] Genotype: Callopora elegantula Hall.

1852. Callopora. Hall, Pal. New York, II, p. 144.

1874. Callopora. Nicholson, Pal. Province Ontario, p. 61.

1874. Callopora. Nicholson, Geol. Mag. new ser., I, p. 13.

1879. Callopora. Hall, Twenty-eighth Ann. Rep. New York State Mus., p. 114.

1882. Callopora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, pp. 154, 251.

1887. Callopora. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 172.

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[1] In 1848 Gray (Proc. Zool. Soc., London, Appendix, 1848, and List of British Animals in the collection of the British Museum, 1848, pp. 109, 146) proposed the generic term Callopora for a single species, the Flustra lineata of Linnæus, but the term failed to gain acceptance, and the species lineata is now considered to be a Membranipora. As Callopora Hall has become deeply engrafted into literature, it seems undesirable under the circumstances to replace it by a new name.

CALLOPORA Hall—Continued.

1887. Callopora. Hall and Simpson, Pal. New York, VI, p. xv.
1889. Callopora. Miller, North American Geol. Pal., p. 295.
1890. Callopora. Ulrich, Geol. Surv. Illinois, VIII, pp. 372, 416.
1893. Callopora. Ulrich, Geol. Minnesota, III, p. 275.
1896. Callopora. Ulrich, Zittel's Textb. Pal. (Engl. Ed.), p. 275.
1897. Callopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 588.
1877. Monticulipora (Section 1). Dybowski, Die Chætetiden d. Ostb. Silur-Form., p. 89.

Callopora aculeolata Hall. See Cœlocaulis ?? aculeolata (Hall).

Callopora (Cœlocaulis) aculeolata Hall. See Cœlocaulis ?? aculeolata (Hall).

Callopora ampla Ulrich.

1893. Callopora ampla. Ulrich, Geol. Minnesota, III, p. 281, pl. xxiii, 13–15, 18–20, 22, 23, 27, 28.

Trenton (Black River and Trenton): Ramsey, Goodhue, and Fillmore counties, Minnesota; Decorah, Iowa; Belleville, Canada.

Callopora andrewsi (Nicholson).

1874. Chætetes pulchellus (not of Milne-Edwards and Haime). Nicholson, Quar. Jour. Geol. Soc. London, XXX, p. 503, pl. xxix, 5–5*b*.
1875. Chætetes pulchellus (not of Milne-Edwards and Haime). Nicholson, Pal. Ohio, II, p. 195, pl. xxi, 5, 5*a*.
1881. Monticulipora (Heterotrypa) Andrewsii. Nicholson, Genus Monticulipora, p. 128, fig. 21, pl. v, 1, 1*a*.
1882. Callopora andrewsi. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 252.
1883. Monticulipora andrewsii. (Van Cleve) Hall, Twelfth Ann. Rep. Indiana Geol. Nat. Hist., p. 249, pl. xi, 9.
1888. Monticulipora andrewsii. James and James, Jour. Cincinnati Soc. Nat., Hist., X, p. 178.
1894. Monticulipora andrewsii. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 200.

Cincinnati (Lorraine): Cincinnati, Ohio and vicinity.

Callopora angularis Ulrich.

1893. Callopora angularis. Ulrich, Geol. Minnesota, III, p. 277, pl. xxii, 37–41.

Trenton (Stones River): Minneapolis, Chatfield, and Fountain, Minnesota.

Callopora aspera Hall. See Lioclema asperum (Hall).

Callopora bipunctata Hall. See Streblotrypa hamiltonensis (Nicholson).

Callopora bispinulata Hall. See Orthopora bispinulata (Hall).

Callopora cellulosa Hall. See Lioclema cellulosum (Hall).

Callopora ? ? cervicornis Hall.

1883. Callopora cervicornis. Hall, Trans. Albany Institute, X, p. 59 (abstract, 1879, p. 3).
1882. Callopora cervicornis. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 238.

Niagara; Waldron, Ind.

Obs. It is doubtful whether this species can be recognized in the absence of figures, from the rather inadequate description.

Callopora cincinnatiensis Ulrich. See Lioclema occidens (Hall and Whitfield).

Callopora ? crenulata Ulrich.

1893. Callopora crenulata. Ulrich, Geol. Minnesota, III, p. 284, pl. xxii, 18–23.

Trenton (Black River and Trenton): St. Paul and Cannon Falls, Minnesota; Decorah, Iowa; Neenah, Wisconsin.

Callopora dalei (Milne-Edwards and Haime).

1851. Chætetes Dalii. Milne-Edwards and Haime, Pol. Foss. Terr. Pal., p. 266, pl. xix, 6, *6a*.

1854. Monticulipora Dalii. Milne-Edwards and Haime, British Foss. Corals, p. 265.

1860. Monticulipora Dalii. Milne-Edwards, Hist. Nat. des Corall., III, p. 277.

1881. Monticulipora (Heterotrypa) ramosa var. dalei. Nicholson, Genus Monticulipora, p. 115, fig. 19, C, D, pl. ii, 4.

1882. Callopora dalei. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 252.

1888. Monticulipora ramosa var. dalei. James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 182.

1894. Monticulipora ramosa var. dalei. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 205.

1874. Chætetes approximatus. Nicholson, Quar. Jour. Geol. Soc. London, XXX, p. 502, pl. xxix, 3, *3a*.

1875. Chætetes approximatus. Nicholson, Pal. Ohio, II, p. 193, pl. xxi, 3.

1883. Monticulipora approximatus. (Van Cleve) Hall, Twelfth Ann. Rep. Indiana Geol. Nat. Hist., p. 250, pl. xi, 6.

Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.

Callopora ? ? diversa Hall.

1883. Callopora ? diversa. Hall, Trans. Albany Institute, X, p. 60 (abstract, 1879, p. 4).

1882. Callopora ? diversa. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 239.

Niagara: Waldron, Indiana.

Obs. It is doubtful whether this species can be recognized in the absence of figures, from the description given.

Callopora dumalis Ulrich.

1893. Callopora dumalis. Ulrich, Geol. Minnesota, III, p. 282, pl. xxiii, 1–8.

Trenton (Stones River and Black River): St. Paul and Cannon Falls, Minnesota.

Callopora elegantula Hall.

1852. Callopora elegantula. Hall, Pal. New York, II, p. 144, pl. xl, *1a–m*.

1879. Callopora elegantula. Hall, Twenty-eighth Ann. Rep. New York State Mus., p. 115.

1882. Callopora elegantula. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 237.

1882. Callopora elegantula. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 250, pl. xi, 6–*6b*.

1896. Callopora elegantula. Ulrich, Zittel's Textb. Pal. (Engl. Ed.), fig. 456, A, B (p. 274).

1897. Callopora elegantula. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xviii, 1–7.

Niagara: Lockport, New York; Waldron and Osgood, Indiana; Sterling, Illinois.

Callopora exsul Hall. See Lioclema? exsul (Hall).

Callopora fistulosa Hall. See Lioclema cellulosum (Hall).

Callopora florida Hall. See Lioclema? (Nicholsonella?) floridum (Hall).

Callopora geniculata Hall. See Callotrypa? geniculata (Hall).

Callopora goodhuensis Ulrich.

1893. Callopora goodhuensis. Ulrich, Geol. Minnesota, III, p. 282, pl. xxiii, 9, 10, 21, 29.

Trenton: Cannon Falls and St. Paul, Minnesota.

Callopora Hamiltonensis Hall. See Streblotrypa hamiltonensis (Nicholson).

Callopora hemispherica Hall. See Fistulipora? hemispherica (Hall).

Callopora heteropora Hall. See Callotrypa heteropora (Hall).

Callopora (Callotrypa) heteropora Hall. See Callotrypa heteropora (Hall).

Callopora Hyale Hall. See Cœlocaulis?? hyale (Hall).

Callopora (Cœlocaulis) Hyale Hall. See Cœlocaulis?? hyale (Hall).

Callopora incontroversa Ulrich.

1886. Callopora incontroversa. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Surv. Minnesota, p. 96.

1893. Callopora incontroversa. Ulrich, Geol. Minnesota, III, p. 278, pl. xxii, 33–36.

Trenton (Stones River): Minneapolis, St. Paul, and Preston, Minnesota.

Callopora incrassata Nicholson. See Fistulipora incrassata (Nicholson).

Callopora internodata Hall. See Callotrypa internodata (Hall).

Callopora (Callotrypa) internodata Hall. See Callotrypa internodata (Hall.)

Callopora irregularis Hall. See Cœlocaulis? irregularis (Hall).

Callopora (Cœlocaulis) irregularis Hall. See Cœlocaulis? irregularis (Hall).

Callopora laminata Hall. See Lioclema? (Nicholsonella?) laminatum (Hall).

Callopora macropora Hall. See Callotrypa macropora (Hall) and Callopora?? oppleta Hall and Simpson.

Callopora (Callotrypa) macropora Hall. See Callotrypa macropora (Hall).

Callopora macropora var. signata Hall. See Callotrypa macropora-signata (Hall).

Callopora (Callotrypa) macropora var. signata Hall. See Callotrypa macropora-signata (Hall).

Callopora maculosa Hall. See Fistulipora maculosa (Hall).

Callopora magnopora Foerste.

1887. Callopora magnopora. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 173; III, pl. xvi, 5.

1895. Callopora magnopora. Foerste, Geol. Surv. Ohio, VII, p. 600, pl. xxix, 5.

Clinton: Dayton and Centerville, Ohio.

Callopora (Cœlocaulis) mediopora Hall. See Cœlocaulis? mediopora (Hall).

Callopora milfordensis James. See Ceramoporella **granulosa-milfordensis** (James).

Callopora minutissima Nicholson. See Lioclema minutissimum (Nicholson).

Callopora missouriensis Rominger. See Lioclema punctatum (Hall).

Callopora multiseriata Hall. See Callotrypa multiseriata (Hall).

Callopora multitabulata (Ulrich).

1886. Monotrypella multitabulata. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Surv. Minnesota, p. 100.
1893. Callopora multitabulata. Ulrich, Geol. Minnesota, III, p. 280, pl. xxiii, 11, 12, 16, 17, 24–26, 30, 31.
1896. Callopora multitabulata. Ulrich, Zittel's Textb. Pal. (Engl. ed.), fig. 456, C, D (p. 274).
Trenton (Black River and Trenton): Burgin and Frankfort, Kentucky; Minneapolis, St. Paul, and Cannon Falls, Minnesota; Nashville, Tennessee; Ottawa, Canada.

Callopora nodulosa (Nicholson).

1874. Chætetes? nodulosus. Nicholson, Quar. Jour. Geol. Soc. London, XXX, p. 506, pl. xxix, 9, 9*a*.
1875. Chætetes nodulosus. Nicholson, Pal. Ohio, II, p. 200, pl. xxi, 10, 10*a*.
1876. Chætetes nodulosus. Nicholson, Ann. Mag. Nat. Hist., ser. 4, XVIII, p. 87, pl. v, 3.
1881. Monticulipora (Heterotrypa) nodulosa. Nicholson, Genus Monticulipora, p. 116, pl. i, 4–4*d*.
1882. Callopora nodulosa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 252; ibid., VI, 1883, p. 83.
1888. Monticulipora nodulosa. James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 182.
1894. Monticulipora nodulosa. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 206.
Cincinnati (Utica): Cincinnati, Ohio, and vicinity.

Callopora ?? nummiformis Hall.

1852. Callopora nummiformis. Hall, Pal. New York, II, p. 148, pl. xl, 5*a*, *b*.
1890. Calloporella? nummiformis. Ulrich, Geol. Surv. Illinois, VIII, p. 416.
Niagara: Lockport, New York.

Callopora oculifera Hall. See Callotrypa oculifera (Hall).

Callopora (Callotrypa) oculifera Hall. See Callotrypa oculifera (Hall).

Callopora ohioensis Foerste. See Lioclemella ohioensis (Foerste).

Callopora onealli (James).

1875. Chætetes ? O'Nealli. James, Introd. Catal. Low. Sil. Foss., p. 2.
1888. Monticulipora o'nealli. James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 174.
1889. Callopora onealli. Miller, North American Geol. Pal., p. 296.
1894. Monticulipora o'nealli. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 194.
Not Monticulipora (Heterotrypa) O'Nealli. Nicholson, Genus Monticulipora, p. 118 = Callopora onealli-sigillarioides (Nicholson).
Cincinnati (Utica): Cincinnati, Ohio, and vicinity.

Callopora onealli-communis (James).

1882. Monticulipora (Heterotrypa) o'nealli ? var. communis. James, Paleontologist, No. 6, p. 47; ibid., No. 7, 1888, pl. i, 8.

Callopora onealli-communis (James)—Continued.

1888. Monticulipora communis. James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 175, pl. ii, 5 *a*, *b*.
1894. Monticulipora communis. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 195.
Cincinnati (Utica): Cincinnati, Ohio, and vicinity.

Callopora onealli-sigillarioides (Nicholson).

1875. Chætetes sigillarioides. Nicholson, Pal. Ohio, II, p. 203, pl. xxii, 9, 9*a*.
1876. Chætetes sigillarioides. Nicholson, Ann. Mag. Nat. Hist., ser. 4, XVIII, p. 87, pl. v, 2.
1882. Callopora sigillaroidea. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 252.
1889. Callopora sigillarioides. Miller, North American Geol. Pal., fig. 464 (p. 296).
1881. Monticulipora (Heterotrypa) O'Nealli (not of James). Nicholson, Genus Monticulipora, p. 118, pl. iii, 3–3*f*.
Cincinnati (Utica): Cincinnati, Ohio, and vicinity.

Callopora ?? oppleta Hall and Simpson.

1879. Callopora macropora (in part). Hall, Thirty-second Ann. Rep. New York State Mus., p. 152 (reprint, 1880, p. 14).
1883. Callopora macropora (in part). Hall, Rep. State Geologist New York for the year 1882, pl. xi, 23, 24.
1887. Callopora oppleta. Hall and Simpson, Pal. New York, VI, p. 21, pl. xi, 23, 24 (called Callopora macropora on plate).
Lower Helderberg; near Clarksville, N. Y.
Obs. This is probably a species of Eridotrypa.

Callopora parasitica Hall. See Lioclema parasiticum (Hall) and Cœlocaulis ? mediopora (Hall).

Callopora (Callotrypa) paucipora Hall. See Callotrypa paucipora (Hall).

Callopora perelegans Hall.

1874. Callopora perelegans. Hall, Twenty-sixth Ann. Rep. New York State Mus., p. 102.
1879. Callopora perelegans. Hall, Thirty-second Ann. Rep. New York State Mus., p. 154 (reprint, 1880, p. 16).
1883. Callopora perelegans. Hall, Rep. State Geologist New York for the year 1882, pl. xii, 10–17.
1887. Callopora perelegans. Hall and Simpson, Pal. New York, VI, p. 22, pl. xii, 10–17, pl. xxiii A, 14.
Lower Helderberg: Clarksville, New York.

Callopora ponderosa Hall. See Lioclema ponderosum (Hall).

Callopora pulchella Ulrich.

1893. Callopora pulchella. Ulrich, Geol. Minnesota, III, p. 283, pl. xxii, 1–12.
Trenton (Black River): St. Paul and Cannon Falls, Minnesota.

Callopora pulchella-persimilis Ulrich.

1893. Callopora pulchella var. persimilis. Ulrich, Geol. Minnesota, III, p. 284, pl. xxii, 13–17.
Trenton (Black River): Cannon Falls, Minnesota.

Callopora punctata Hall. See Lioclema punctatum (Hall).

Callopora punctillata Winchell. See Lioclema punctillatum (Winchell).

Callopora ramosa (D'Orbigny).

1850. Monticulipora ramosa. D'Orbigny, Prodr. de Pal., I, p. 25.
1851. Chætetes ramosus. Milne-Edwards and Haime, Pol. Foss. Terr. Pal., p. 266, pl. xix, 2, 2*a*.
1854. Monticulipora ramosa. Milne-Edwards and Haime, British Foss. Corals, p. 265.
1860. Monticulipora ramosa. Milne-Edwards, Hist. Nat. des Corall., III, p. 277.
1876. Chætetes ramosus. Nicholson, Ann. Mag. Nat. Hist., ser. 4, XVIII, p. 88.
1879. Monticulipora (Heterotrypa) ramosa. Nicholson, Pal. Tab. Corals, p. 296, pl. xiii, 2, 2*a*.
1881. Chætetes ramosus. Quenstedt, Roehren- und Sternkorallen, p. 77, pl. cxlvi, 13–18.
1881. Monticulipora (Heterotrypa) ramosa. Nicholson, Genus Monticulipora, p. 110, fig. 18, pl. ii, 2, 2*a*.
1882. Callopora ramosa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 252.
1888. Monticulipora ramosa. James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 181.
1890. Callopora ramosa. Ulrich, Geol. Surv. Illinois, VIII, fig. 5*b* (p. 315).
1894. Monticulipora ramosa. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 204.
1896. Monticulipora (Heterotrypa) ramosa. Zittel, Textb. Pal. (Engl. ed.), fig. 185 (p. 103), fig. 186 B (p. 103).
1874. Chætetes Dalei (not of Milne-Edwards and Haime). Nicholson, Quar. Jour. Geol. Soc. London, XXX, p. 501, pl. xxix, 1, 1*a*.
1875. Chætetes Dalei (not of Milne-Edwards and Haime). Nicholson, Pal. Ohio, II, p. 192, pl. xxi, 1, 1*a*.
1883. Monticulipora Dalii. (Van Cleve) Hall, Twelfth Ann. Rep Indiana Geol. Nat. Hist., p. 249, pl. xi, 2.

Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.

Callopora ramosa var. rugosa Ulrich. See Callopora rugosa (Milne-Edwards and Haime).

Callopora rugosa (Milne-Edwards and Haime).

1851. Chætetes rugosus. Milne-Edwards and Haime, Pol. Foss. Terr. Pal., p. 268, pl. xx, 6, 6*a*.
1854. Monticulipora rugosa. Milne-Edwards and Haime, British Foss. Corals, p. 265.
1860. Monticulipora rugosa. Milne-Edwards, Hist. Nat. des Corall., III, p. 277.
1874. Chætetes rugosus. Nicholson, Quar. Jour. Geol. Soc. London, XXX, p. 502, pl. xxix, 2.
1875. Chætetes rugosus. Nicholson, Pal. Ohio, II, p. 193, pl. xxi, 2.
1876. Chætetes rugosus. Nicholson, Ann. Mag. Nat. Hist., ser. 4, XVIII, p. 87, pl. v, 4.
1877. Monticulipora rugosa. Dybowski, Die Chætetiden d. Ostb. Silur-Form, p. 92, pl. iii, 1.
1881. Monticulipora (Heterotrypa) ramosa var. rugosa. Nicholson, Genus Monticulipora, p. 113, fig. 19, A, B, pl. ii, 3.
1881. Chætetes rugosus. Quenstedt, Roehren- und Sternkorallen, p. 78, pl. cxlvi, 19, 20.
1882. Callopora ramosa var. rugosa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 252.
1888. Monticulipora ramosa var. rugosa. James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 182.

Callopora rugosa (Milne-Edwards and Haime)—Continued.

1894. Monticulipora ramosa var. rugosa. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 205.
Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.

Callopora sigillaroidea Ulrich. See Callopora onealli-sigillarioides (Nicholson).

Callopora singularis Hall. See Trematopora ? singularis (Hall).

Callopora (Callotrypa) striata Hall. See Callotrypa striata (Hall).

Callopora subnodosa Ulrich.

1890. Callopora subnodosa. Ulrich, Geol. Surv. Illinois, VIII, p. 417, pl. xxxiii, 5, 5*c*, fig. 3*d* (p.308).
1889. Callopora subnodosa. (Ulrich in press), Miller, North American Geol. Pal., fig. 465 (p. 296).
Cincinnati (Richmond): Blanchester, Waynesville, Hanover, and other localities in Ohio; Richmond and Versailles, Indiana; Wilmington and Savannah, Illinois; Iron Ridge, Wisconsin.

Callopora subplana Ulrich.

1882. Callopora subplana. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 253, pl. xi, 7, 7*b*.
1894. Callopora subplana. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 196.
Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.

Callopora undulata Ulrich.

1886. Callopora undulata. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Surv. Minnesota, p. 95.
1893. Callopora undulata. Ulrich, Geol. Minnesota, III, p. 279, pl. xxii, 24–31.
Trenton (Black River): Minneapolis and St. Paul, Minnesota.

Callopora unispina Hall. See Callotrypa unispina (Hall) and Callotrypa striata (Hall).

Callopora (Callotrypa) unispina Hall. See Callotrypa unispina (Hall).

Callopora venusta Hall. See Cœlocaulis venusta (Hall).

Callopora (Cœlocaulis) venusta Hall. See Cœlocaulis venusta (Hall).

CALLOPORELLA Ulrich. Genotype: Calloporella harrisi Ulrich = Monticulipora (Heterotrypa) circularis James.

1882. Calloporella. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 154.
1889. Calloporella. Miller, North American Geol. Pal., p. 296.
1890. Calloporella. Ulrich, Geol. Surv. Illinois, VIII, pp. 373, 418.

Calloporella circularis (James).

1882. Monticulipora (Heterotrypa) circularis. James, Paleontologist, No. 6, p. 46.
1883. Monticulipora circularis. James, Paleontologist, No. 7, p. 58, pl. i, 3, 3*a*.
1883. Calloporella harrisi. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 91, pl. i, 5–5*c*.
1888. Monticulipora lens (not Nebulipora lens McCoy). James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 165.
1894. Monticulipora lens (not Nebulipora lens McCoy). J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 181.
Cincinnati (Richmond): Oxford, Waynesville, Blanchester, and other localities in Ohio.

Calloporella harrisi Ulrich. See Calloporella circularis (James).

Calloporella ? lens (Whitfield).

1878. Fistulipora lens. Whitfield, Ann. Rep. Wisconsin Geol. Surv. for 1877, p. 69.

1882. Fistulipora lens. Whitfield, Geol. Surv. Wisconsin, IV, p. 256, pl. xi, 5, 6.

Cincinnati (Richmond): Delafield, Wisconsin.

Calloporella ? nodulosa Ulrich.

1890. Calloporella ? nodulosa. Ulrich, Geol. Surv. Illinois, VIII, p. 418, pl. xxxiii, 4, *4a*.

1895. Monticulipora verrucosa. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 85.

Cincinnati (Richmond): Savannah, Illinois.

Calloporella ? nummiformis Ulrich. See Callopora ?? nummiformis Hall.

CALLOTRYPA Hall and Simpson. Genotype: Callopora macropora Hall.

1887. Callotrypa. Hall and Simpson, Pal. New York, VI, pp. xvi, 24.

1889. Callotrypa. Miller, North American Geol. Pal., p. 296.

1890. Callotrypa. Ulrich, Geol. Surv. Illinois, VIII, p. 376.

1897. Callotrypa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 551.

Callotrypa ? geniculata (Hall).

1886. Callopora geniculata. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxv, 1–3.

1887. Callopora geniculata. Hall and Simpson, Pal. New York, VI, p. 75, pl. xxv, 1–3.

Upper Helderberg: Ontario.

Callotrypa heteropora (Hall).

1874. Callopora heteropora. Hall, Twenty-sixth Ann. Rep. New York State Mus., p. 102.

1879. Callopora heteropora. Hall, Thirty-second Ann. Rep. New York State Mus., p. 153 (reprint, 1880, p. 15).

1883. Callopora heteropora. Hall, Rep. State Geologist New York for 1882, pl. xi, 32–34, pl. xiii, 5–8.

1887. Callopora (Callotrypa) heteropora. Hall and Simpson, Pal. New York, VI, p. 25, pl. xi, 32–34, pl. xiii, 5–8, pl. xxiii, 3.

Lower Helderberg: Clarksville, New York.

Callotrypa internodata (Hall).

1883. Callopora internodata. Hall, Trans. Albany Institute, X, p. 182 (abstract, 1881, p. 182).

1884. Callopora internodata. Hall, Rep. State Geologist New York for the year 1883, p. 16.

1887. Callopora (Callotrypa) internodata. Hall and Simpson, Pal. New York, VI, p. 189.

Hamilton: Darien Center, New York.

Callotrypa macropora (Hall).

1874. Callopora macropora. Hall, Twenty-sixth Ann. Rep. New York State Mus., p. 101.

1879. Callopora macropora. Hall, Thirty-second Ann. Rep. New York State Mus., p. 152 (reprint, 1880, p. 14).

Callotrypa macropora (Hall)—Continued.

1883. Callopora macropora (in part). Hall, Rep. State Geologist New York for the year 1882, pl. xi, 23–29.
1887. Callopora (Callotrypa) macropora. Hall and Simpson, Pal. New York, VI, p. 24, pl. xi, 25–29, pl. xxiii, 15–19.
1897. Callotrypa macropora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xviii, 12–14.
Lower Helderberg: Catskill, Clarksville, and Schoharie, New York.

Callotrypa macropora-signata (Hall).

1874. Trematopora signata. Hall, Twenty-sixth Ann. Rep. New York State Mus., p. 104.
1879. Callopora macropora var. signata. Hall, Thirty-second Ann. Rep. New York State Mus., p. 153 (reprint, 1880, p. 15).
1883. Callopora macropora var. signata. Hall, Rep. State Geologist New York for the year 1882, pl. xi, 30, 31.
1887. Callopora (Callotrypa) macropora var. signata. Hall and Simpson, Pal. New York, VI, p. 25, pl. xi, 30, 31.
Lower Helderberg: Clarksville, New York.

Callotrypa multiseriata (Hall).

1883. Callopora multiseriata. Hall, Trans. Albany Institute, X, p. 149 (abstract, 1881, p. 7).
1883. Callopora multiseriata. Hall, Rep. State Geologist New York for the year 1882, pl. xxiv, 18, 19.
1886. Callopora multiseriata. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxv, 6, 7.
1887. Callopora multiseriata. Hall and Simpson, Pal. New York, VI, p. 75, pl. xxv, 6, 7, pl. xxvi, 18, 19.
1889. Callotrypa multiseriata. Miller, North American Geol. Pal., p. 296.
1890. Callotrypa multiseriata. Ulrich, Geol. Surv. Illinois, VIII, p. 376.
Upper Helderberg: Le Roy, New York.

Callotrypa oculifera (Hall).

1879. Callopora oculifera. Hall, Thirty-second Ann. Rep. New York State Mus., p. 155 (reprint, 1880, p. 17).
1883. Callopora oculifera. Hall, Rep. State Geologist New York for the year 1882, pl. xiii, 10.
1887. Callopora (Callotrypa) oculifera. Hall and Simpson, Pal. New York, VI, p. 27, pl. xiii, 10, pl. xxiii, 6.
Lower Helderberg: Clarksville, New York.

Callotrypa paucipora (Hall and Simpson).

1887. Callopora (Callotrypa) paucipora. Hall and Simpson, Pal. New York, VI, pl. xxiii, 21. (Not described.)
Lower Helderberg: Clarksville, New York.

Callotrypa striata (Hall and Simpson).

1879. Callopora unispina (in part). Hall, Thirty-second Ann. Rep. New York State Mus., p. 153 (reprint, 1880, p. 15).
1883. Callopora unispina (in part). Hall, Rep. State Geologist New York for the year 1882, pl. xi, 35–41.
1887. Callopora (Callotrypa) striata. Hall and Simpson, Pal. New York, VI, p. 26, pl. xi, 38–41, pl. xxiii, 13, 14.
Lower Helderberg: Catskill Creek and Clarksville, New York.

Callotrypa unispina (Hall).

1874. Callopora unispina. Hall, Twenty-sixth Ann. Rep. New York State Mus., p. 102.

Callotrypa unispina (Hall)—Continued.

1879. Callopora unispina. Hall, Thirty-second Ann. Rep. New York State Mus., p. 153 (reprint, 1880, p. 15).
1883. Callopora unispina. Hall, Rep. State Geologist New York for the year 1882, pl. xi, 35–39, ? 40–41.
1887. Callopora (Callotrypa) unispina. Hall and Simpson, Pal. New York, VI, p. 26, pl. xi, 35–37.
1897. Callotrypa unispina. Simpson, Fourteenth Ann. Rep. New York State Geologist for the year 1894, pl. xviii, 8–11.

Lower Helderberg: Catskill Creek and Clarksville, New York.

Carinopora Nicholson. See Semicoscinium Prout.

Carinopora Hindei Nicholson. See Semicoscinium hindei (Nicholson).

Cavea D'Orbigny. Not a Paleozoic genus.

Cavea prisca Gabb and Horn. See Streblotrypa prisca (Gabb and Horn).

CERAMELLA Hall and Simpson. Genotype: Ceramella scidacea Hall and Simpson.

1887. Ceramella. Hall and Simpson, Pal. New York, VI, p. xix.
1889. Ceramella. Miller, North American Geol. Pal., p. 296.
1897. Ceramella. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 527.

Obs.—This genus is probably a synonym of either Glyptopora Ulrich or Phractopora Hall. The figures and description are insufficient to decide, the specimens being apparently young.

Ceramella scidacea Hall and Simpson.

1887. Ceramella scidacea. Hall and Simpson, Pal. New York, VI, p. 420, pl. lxiv, 5–8.
1897. Ceramella scidacea. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xiv, 2–6.

Hamilton: Spurgen's Glen, Norton's Landing, Cayuga Lake, and Darien Center, New York.

CERAMOPHYLLA Ulrich. Genotype: Ceramophylla frondosa Ulrich.

1893. Ceramophylla. Ulrich, Geol. Minnesota, III, p. 331.

Ceramophylla frondosa Ulrich.

1893. Ceramophylla frondosa. Ulrich, Geol. Minnesota, III, p. 331, pl. xxviii, 3–7.
1896. Ceramophylla frondosa. Ulrich, Zittel's Textb. Pal. (Engl. ed.), fig. 438 (p. 268).

Trenton (Black River): St. Paul and Goodhue County, Minnesota.

CERAMOPORA Hall. Genotype: Ceramopora imbricata Hall.

1852. Ceramopora. Hall, Pal. New York, II, p. 168.
1860. Ceramopora. Eichwald, Lethæa Rossica, I, p. 412.
1882. Ceramopora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 156.
1887. Ceramopora. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 169.
1887. Ceramopora. Hall and Simpson, Pal. New York, VI, p. xviii.
1888. Ceramopora. James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 36.
1889. Ceramopora. Miller, North American Geol. Pal., p. 296.
1890. Ceramopora. Ulrich, Geol. Sur. Illinois, VIII, pp. 380, 462.
1896. Ceramopora. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 267.

CERAMOPORA Hall—Continued.

1897. Ceramopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 563.

Ceramopora agellus Hall. See Ceramopora ? confluens Hall.

Ceramopora alternata James. See Cœloclema alternatum (James).

Ceramopora ? beani James. See Paleschara beani (James).

Ceramopora clypeiformis Hall. Not recognized.

1883. Ceramopora (Lichenalia?) clypeiformis. Hall, Trans. Albany Institute, X, p. 188 (abstract, 1881, p. 188).

1884. Lichenalia (Ceramopora) clypeiformis. Hall, Rep. State Geologist New York for the year 1883, p. 37.

Hamilton: York, Moscow, New York.

Ceramopora concentrica James. See Cœloclema concentricum (James).

Ceramopora ? confluens Hall.

1876. Ceramopora confluens. Hall, Twenty-eighth Ann. Rep. New York State Museum (documentary edition), pl. vii, 4, 5; ibid. (Museum edition, 1879), p. 119, pl. viii, 4, 5.

1882. Ceramopora confluens. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 243, pl. vii, 4, 5.

1897. Ceramopora confluens. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xx, 14, 15.

1876. Ceramopora ? (Berenicea) labecula. Hall, Twenty-eighth Ann. Rep. New York State Mus. (documentary edition), pl. viii, 1-3; ibid. (Museum edition), 1879, p. 119, pl. viii, 1-3.

1882. Ceramopora labecula. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 242, pl. vii, 1-3.

1897. Ceramopora labecula. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xx, 11.

1876. Ceramopora agellus. Hall, Twenty-eighth Ann. Rep. New York State Mus. (documentary edition), pl. viii, 6; ibid. (Museum edition), 1879, p. 120, pl. viii, 6.

1882. Ceramopora agellus. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 243, pl. vii, 6.

Niagara: Waldron, Indiana.

Obs. This species is probably a fistuliporoid. C. agellus and C. labecula are apparently young specimens.

Ceramopora ? expansa (James).

1879. Alveolites expansa. James, Paleontologist, No. 3, p. 19.

1887. Ceramopora expansa. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 169; ibid., III, 1888, pl. xvii, 13.

Clinton: Clinton County, Ohio.

Ceramopora ? explanata Hall.

1883. Ceramopora? (Lichenalia?) explanata. Hall, Trans. Albany Institute, X, p. 61 (abstract, 1879, p. 5).

1882. Ceramopora ? (Lichenalia?) explanata. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 245.

Niagara: Waldron, Indiana.

Ceramopora foliacea Hall. See Meekopora foliacea (Hall).

Ceramopora ? (Lichenalia) foliacea Hall and Simpson. See Fistulipora foliacea (Hall).

Ceramopora Huronensis Nicholson. See Fistulipora huronensis (Nicholson).

Ceramopora imbricata Hall.

1852. Ceramopora imbricata. Hall, Pal. New York, II, p. 169, pl. xlE, 1 *a–i*.

1890. Ceramopora imbricata. Ulrich, Geol. Surv. Illinois, VIII, p. 463, pl. xxxix, 1–*b*.

Niagara: Lockport, New York; Osgood, Indiana.

Ceramopora ?? imbricella (Hall).

1883. Lichenalia (Ceramopora) imbricella. Hall, Trans. Albany Institute, X, p. 188 (abstract 1881, p. 188).

1884. Lichenalia (Ceramopora) imbricella. Hall, Rep. State Geologist New York for the year 1883, p. 37.

1887. Ceramopora imbricella. Hall and Simpson, Pal. New York, VI, p. 236.

Hamilton: Near Alden, Erie County, New York.

Obs. It is doubtful whether this form can be recognized from the descriptions given.

Ceramopora ?? incrustans Hall.

1852. Ceramopora incrustans. Hall, Pal. New York, II, p. 169, pl. xlE, 2 *a–d*.

Niagara: Lockport, New York.

Obs. A reexamination of the type specimens of this species will very probably show it to be a species of Fistulipora. In that case it will require renaming, as the name is preoccupied by the genotype of Fistulipora.

Ceramopora ? irregularis James. See Batostoma implicatum (Nicholson).

Ceramopora labecula Hall. See Ceramopora ? confluens Hall.

Ceramopora ? (Berenicea) labecula Hall. See Ceramopora ? confluens Hall.

Ceramopora ? labeculoidea Hall.

1879. Ceramopora labeculoidea. Hall, Thirty-second Ann. Rep. New York State Mus., p. 158 (reprint 1880, p. 20).

1883. Ceramopora labeculoidea. Hall, Rep. State Geologist New York for the year 1882, pl. xvi, 1, 2.

1887. Ceramopora labeculoidea. Hall and Simpson, Pal. New York, VI, p. 33, pl. xvi, 1, 2.

1897. Ceramopora labeculoidea. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xx, 10.

Lower Helderberg: Clarksville, New York.

Obs. This species is probably the young of some fistuliporoid.

Ceramopora ? maculata Hall.

1874. Ceramopora maculata. Hall, Twenty-sixth Ann. Rep. New York State Mus., p. 108.

1879. Ceramopora maculata. Hall, Thirty-second Ann. Rep. New York State Mus., p. 159 (reprint, 1880, p. 21).

1883. Ceramopora maculata. Hall, Rep. State Geologist New York for the year 1882, pl. xvi, 5–11.

1887. Ceramopora maculata. Hall and Simpson, Pal. New York, VI, p. 33, pl. xvi, 5–11.

1897. Ceramopora maculata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xx, 5–9.

Lower Helderberg: Clarksville and Schoharie, New York.

Ceramopora (Berenicea) maxima Hall. Abandoned by the author.

1874. Ceramopora (Berenicea) maxima. Hall, Twenty-sixth Ann. Rep. New York State Mus., p. 109.

1879. Ceramopora (Berenicea) maxima. Hall, Thirty-second Ann. Rep. New York State Mus., p. 159 (reprint, 1880, p. 21.)

1883. Ceramopora (Berenicea) maxima. Hall, Rep. State Geologist New York for the year 1882, pl. xvi, 12.

Lower Helderberg: Schoharie, New York.

Obs. In the Pal. New York, VI, 1887, p. 34, Hall and Simpson say that this name may be dropped from the list of determined species.

Ceramopora nicholsoni (James). See Chiloporella nicholsoni (James).

Ceramopora ? notha Hall.

1883. Ceramopora (Paleschara ?) nothus. Hall, Trans. Albany Institute, X, p. 62 (abstract, 1879, p. 6.)

1882. Ceramopora (Paleschara ?) nothus. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 244.

Niagara: Waldron, Indiana.

Ceramopora (Paleschara ?) nothus Hall. See Ceramopora ? notha Hall.

Ceramopora Ohioensis (Nicholson). See Ceramoporella ohioensis (Nicholson).

Ceramopora ? orbiculata Ringueberg.

1886. Ceramopora orbicutata. Ringueberg, Bull. Buffalo Soc. Nat. Hist., V, p. 19, pl. ii, 13, 13*a*.

Niagara: Lockport, New York.

Ceramopora ? parvicella Hall.

1879. Ceramopora parvicella. Hall, Thirty-second Ann. Rep. New York State Mus., p. 158 (reprint, 1880, p. 20.)

1883. Ceramopora parvicella. Hall, Rep. State Geologist New York for the year 1882, pl. xvi, 3, 4.

1887. Ceramopora ? parvicella. Hall and Simpson, Pal. New York, VI, p. 34, pl. xvi, 3, 4.

1897. Ceramopora parvicella. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xx, 12, 13.

Lower Helderberg: Clarksville, New York.

Ceramopora radiata James. Not recognizable.

1878. Ceramopora radiata. James, Paleontologist, No. 2, p. 12.

Cincinnati: Cincinnati, Ohio

Obs. An examination of the type specimen can alone decide just what form this is, but it is probably a young example of Ceramoporella granulosa-milfordensis (James).

Ceramopora ? raripora Hall.

1883. Ceramopora raripora. Hall, Trans. Albany Institute, X, p. 62 (abstract 1879, p. 6.)

1882. Ceramopora raripora. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 244.

Niagara: Waldron, Indiana.

Ceramopora whitei (James). See Ceramoporella whitei (James).

CERAMOPORELLA Ulrich. Genotype: Ceramoporella distincta Ulrich.

1882. Ceramoporella. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 156.

1889. Ceramoporella. Miller, North American Geol. Pal., p. 297.

CERAMOPORELLA Ulrich—Continued.

1890. Ceramoporella. Ulrich, Geol. Surv. Illinois, VIII, pp. 380, 464.
1893. Ceramoporella. Ulrich, Geol. Minnesota, III, p. 328.
1896. Ceramoporella. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 267.
1897. Ceramoporella. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 564.

Ceramoporella distincta Ulrich.

1890. Ceramoporella distincta. Ulrich, Geol. Surv. Illinois, VIII, p. 464, pl. xxxix, 6, 6*a*.

Not Ceramoporella distincta. Ulrich, Geol. Minnesota, III, 1893, p. 328, pl. xxviii, 13; Zittel's Textb. Pal. (Engl. ed.), 1896, fig. 435 (p. 267); Simpson, Fourteenth Ann. Rep. State Geol. New York for the year 1894, 1897, fig. 130 (p. 565).

Cincinnati (Utica and Lorraine): Cincinnati, Ohio, and vicinity.

Ceramoporella granulosa Ulrich.

1890. Ceramoporella granulosa. Ulrich, Geol. Surv. Illinois, VIII, p. 466, pl. xli, 2, 2*a*.

Cincinnati (Richmond): Wilmington, Illinois; Iron Ridge, Wisconsin; Richmond and Versailles, Indiana; Oxford, Waynesville, and other localities in Ohio.

Obs. Hall and Simpson (Pal. New York, VI, 1887, pl. xiv, 15–17, pl. xxiii, 4) figure the Cincinnati (Utica) form of this as Fistulipora sp.? Figure 17 is incorrect, no vesicles or vesicular tissue being found in this species.

Ceramoporella granulosa-milfordensis James.

1878. Callopora milfordensis. James, Paleontologist, No. 2, p. 11.
1888. Monticulipora (Fistulipora) milfordensis. James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 36. pl. i, 7–7*b*.
1896. Monticulipora (Fistulipora) milfordensis. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 122.

Cincinnati (Utica): Milford, Ohio; Cincinnati, Ohio, and vicinity.

Ceramoporella inclusa Ulrich.

1893. Ceramoporella inclusa. Ulrich, Geol. Minnesota, III, p. 329, pl. xxviii, 8–11.
1897. Ceramoporella inclusa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 132 (p. 565).

Trenton (Stones River, Black River, and Trenton): Minneapolis, St. Paul, Cannon Falls, and several localities in Goodhue and Fillmore counties, Minnesota.

Ceramoporella interporosa Ulrich.

1893. Ceramoporella interporosa. Ulrich, Geol. Minnesota, III, p. 330, pl. xxviii, 12.
1897. Ceramoporella interporosa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 131 (p. 565).

Trenton: Goodhue County, Minnesota.

Ceramoporella? irregularis (Whitfield).

1878. Alveolites irregularis. Whitfield, Ann. Rep. Wisconsin Geol. Surv. for 1877, p. 72.
1882. Alveolites irregularis. Whitfield, Geol. Surv. Wisconsin, IV, p. 251, pl. xi, 1, 2.

Cincinnati (Richmond): Iron Ridge, Wisconsin.

Ceramoporella ohioensis (Nicholson).

1875. Ceramopora Ohioensis. Nicholson, Pal. Ohio, II, p. 265, pl. xxv, 10*a*, *b*, *e* (not 10*c*, *d*).

1888. Ceramopora ohioensis. James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 37.

1889. Ceramopora ohioensis. Miller, North American Geol. Pal., fig. 466 (p. 297).

1890. Ceramoporella? ohioensis. Ulrich, Geol. Surv. Illinois, VIII, p. 466, pl. xxxix, 2, 2*a*.

Cincinnati (Utica, Lorraine, and Richmond): Cincinnati, Ohio, and vicinity. A common species in the Utica, Lorraine, and Richmond groups of Ohio, Indiana, Kentucky, Tennessee, Illinois, and Wisconsin.

Ceramoporella stellata Ulrich.

1890. Ceramoporella stellata. Ulrich, Geol. Surv. Illinois, VIII, p. 465, pl. xli, 1, 1*a*.

Cincinnati (Richmond): Sterling, Illinois.

Ceramoporella whitei (James).

1878. Ceramopora Whitei. James, Paleontologist, No. 2, p. 12.

1888. Ceramopora? whitei. James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 38, pl. i, 9, 9*a*.

Cincinnati (Lorraine and Richmond): Cincinnati, Ohio, and vicinity. Richmond and Versailles, Indiana; Oxford, Waynesville, and other localities in Ohio.

Ceriopora Goldfuss. Not a Paleozoic genus.

Ceriopora constellata Van Cleve (Mss.). See **Constellaria constellata** (Van Cleve) Dana.

Ceriopora? Hamiltonensis Nicholson. See **Streblotrypa hamiltonensis** (Nicholson).

Ceriopora ramosa D'Orbigny. Not recognizable without material.

1842. Ceriopora ramosa. D'Orbigny, Voyage dans l'Amérique Méridonale, III, p. 56, pl. vi, 9, 10.

Carboniferous: Yarbichambi, Bolivia.

CHÆTETES Fischer. Genotype Chætetes radians Fischer. Not considered a bryozoan.

1837. Chætetes. Fischer, Oryct. du Gouv. Moscou, p. 159.

Not Chætetes of many authors who have used the name for true bryozoa.

Chætetes abruptus Hall. See **Monotrypella? abrupta** (Hall).

Chætetes (Monotrypella) abruptus Hall and Simpson. See **Monotrypella? abrupta** (Hall).

Chætetes æquidistans Hall. Can not be recognized.

1883. Chætetes æquidistans. Hall, Trans. Albany Institute, X, p. 146 (abstract, 1881, p. 4).

Upper Helderberg, New York.

Chætetes approximatus Nicholson. See **Callopora dalei** (Milne-Edwards and Haime).

Chætetes (Monotrypella) arbusculus Hall. See **Monotrypella ? arbuscula** (Hall).

Chætetes attritus Nicholson. See **Dekayia aspera** (Milne-Edwards and Haime).

Chætetes Barrandi Nicholson. See Heterotrypa ? barrandei (Nicholson).

Chætetes briareus Nicholson. See Eridotrypa briareus (Nicholson).

Chætetes calyculus James. See Aspidopora calycula (James).

Chætetes ? carbonarius Worthen. See Stenopora carbonaria (Worthen).

Chætetes cincinnatiensis James. See Monticulipora cincinnatiensis (James).

Chætetes ? clathratulus (James) Nicholson. See Escharopora pavonia (D'Orbigny).

Chætetes clavacoideus James. See Leptotrypa clavacoidea (James).

Chætetes colliculatus Hall. See Monotrypa colliculata (Hall).

Chætetes columnaris Hall. Belongs to genus Tetradium, now considered a coral.

1847. Chætetes columnaris. Hall, Pal. New York, I, p. 68, pl. xxiii, 4, 4*a*.

Chætetes compressus Ulrich. See Peronopora compressa (Ulrich).

Chætetes consimilis Hall. See Monotrypella ? consimilis (Hall).

Chætetes constellatus Quenstedt. See Constellaria constellata (Van Cleve) Dana.

Chætetes corticans Nicholson. See Spatiopora corticans (Nicholson).

Chætetes corticosa Hall. See Eridotrypa corticosa (Hall).

Chætetes crebriramus Hall. Not recognized.

1883. Chætetes crebriramus. Hall, Trans. Albany Institute, X, p. 146 (abstract, 1881, p. 4).

Hamilton: Falls of the Ohio.

Chætetes crustulatus James. Not recognizable.

1878. Chætetes crustulatus. James, Paleontologist, No. 1, p. 1; ibid., No. 3, 1879, p. 20.

1888. Monticulipora crustulata. James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 23, pl. i, 2, 2*a*.

1895. Monticulipora crustulata. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 82.

Cincinnati: Cincinnati, Ohio.

Obs. A variety of forms was included under this name, many of which have since been given other names. The description is so general that it can not be narrowed down to one recognizable form; hence, in the interests of science, the name should be dropped.

Chætetes dalei Milne-Edwards and Haime. See Callopora dalei (Milne-Edwards and Haime).

Chætetes dalei Nicholson (not Milne-Edwards and Haime). See Callopora ramosa (D'Orbigny).

Chætetes decipiens Rominger. See Peronopora decipiens (Rominger).

Chætetes delicatulus Nicholson. See Bythopora delicatula (Nicholson).

Chætetes (Monotrypella) densus Hall and Simpson. See Monotrypella ? densa (Hall).

Chætetes discoideus James. See Amplexopora ? discoidea (James).

Chætetes egenus Hall. Not recognized.

1883. Chætetes egenus. Hall, Trans. Albany Institute, X, p. 146 (abstract, 1881, p. 4).

Upper Helderberg: Onondaga Valley, New York.

Chætetes elegans Ulrich. See Discotrypa elegans (Ulrich).

Chætetes ?? expansus Ringueberg.

1886. Chætetes expansus. Ringueberg, Bull. Buffalo Soc. Nat. Hist., V, p. 20, pl. ii, 17.

Niagara: Lockport, New York.

Obs. Probably a valid species, but requires further study to determine generic position.

Chætetes filiasus Milne-Edwards and Haime. See Amplexopora filiosa (D'Orbigny).

Chætetes Fletcheri Nicholson (not Milne-Edwards and Haime). See Dekayella ulrichi (Nicholson).

Chætetes Fletscheri Quenstedt (not Milne-Edwards and Haime). See Dekayella ulrichi (Nicholson).

Chætetes frondosus Milne-Edwards and Haime. See Heterotrypa frondosa (D'Orbigny).

Chætetes frondosus Nicholson (not D'Orbigny). See Peronopora decipiens (Rominger).

Chætetes frondosus Quenstedt. See Peronopora decipiens (Rominger) and Heterotrypa frondosa (D'Orbigny).

Chætetes frondosus limatus Quenstedt. See Heterotrypa frondosa (D'Orbigny).

Chætetes fruticosus Hall. (Lower Helderberg.) Name preoccupied. See Monotrypella? arbuscula (Hall).

Chætetes fruticosus Hall (Hamilton). Can not be recognized.

1876. Chætetes fruticosus. Hall, Illus. Devonian Foss., pl. xxxviii, 1-5. (Not described.)

1899. Monotrypa fruticosa. (Hall's species ?) Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 136, fig. 20.

Hamilton: Canandaigua Lake and Eighteenmile Creek, New York.

Chætetes furcatus Hall. Can not be recognized.

1876. Chætetes furcatus. Hall, Illus. Devonian Foss., pl. xxxvii, 1-5, pl. xxxviii, 6-9. (Not described.)

1899. Monotrypa? furcata. (Hall's species ?) Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 137, fig. 21.

Hamilton: Norton's Landing and Eighteenmile Creek, New York.

Chætetes fusiformis Whitfield. See Lioclemella fusiformis (Whitfield).

Chætetes gracilis James. See Bythopora gracilis (Nicholson).

Chætetes granuliferus Ulrich. See Homotrypella granulifera (Ulrich).

Chætetes ?? hamiltonensis Winchell.

1866. Chætetes Hamiltonensis. Winchell, Rep. Low. Penin. Michigan, p. 89.

Hamilton, Petoskey, Michigan.

Obs. A valid species, but requires further investigation to determine its generic position.

Chætetes Helderbergiæ Hall. See **Monotrypa ? helderbergiæ (Hall).**

Chætetes humilis Hall. Can not be recognized.

1876. Chætetes humilis. Hall, Illus. Devonian Foss., pl. xxxvii, 11-15. (Not described.)

1881. Chætetes humilis. Quenstedt, Roehren- und Sternkorallen, p. 69, pl. cxlv, 34.

Upper Helderberg: Western New York.

Chætetes implicata Ulrich. See **Batostoma implicatum (Nicholson).**

Chætetes internascens Hall. Not recognized.

1883. Chætetes ? (Trematopora?) internascens. Hall, Trans. Albany Institute, X, p. 147 (abstract, 1881, p. 5).

Hamilton: Falls of the Ohio.

Chætetes irregularis Ulrich. See **Leptotrypa ? irregularis (Ulrich).**

Chætetes Jamesi Nicholson. See **Batostoma jamesi (Nicholson).**

Chætetes læviramus Quenstedt. See **Bythopora gracilis (Nicholson).**

Chætetes lycoperdon (Say) Hall. Not recognizable.

—— Chætetes lycoperdon. Say (Mss.).

1847. Chætetes lycoperdon. Hall, Pal. New York, I, p. 64, pl. xxiii, 1*a*–*i*, pl. xxiv, 1*a*–*o*, 2, 2*a*, 3; ibid., p. 48, pl. xii, 3, 5; ibid., p. 276, pl. lxxv, 2*a*–*f*.

1852. Chætetes lycoperdon. Hall, Pal. New York, II, p. 40, pl. xvii, 1*a*–*h*.

1874. Chætetes lycoperdon. Nicholson and Hinde, Canadian Jour., new ser., XIV, p. 140.

1881. Chætetes lycoperdon. Quenstedt, Roehren- und Sternkorallen, p. 71, pl. cxlvi, 1, 2.

Trenton.

Obs. The term lycoperdon has deservedly fallen into disuse. As it was never properly defined and limited, the name came to be used by many authors for any and every kind of bryozoan, especially if it had a hemispheric or globose shape.

Chætetes lycoperdon James (not Hall).

1878. Chætetes lycoperdon. James, Paleontologist, No. 2, p. 11.

1879. Chætetes lycopodites (not Vanuxem). James, Paleontologist, No. 3, p. 20.

Cincinnati: Cincinnati, Ohio.

Obs. The form thus referred by James can not be identified.

Chætetes lycopodites James (not Vanuxem). See Chætetes lycoperdon James (not Hall).

Chætetes mammulatus Milne-Edwards and Haime. See **Monticulipora mammulata (D'Orbigny).**

Chætetes mammulatus Nicholson (not D'Orbigny). See **Heterotrypa frondosa (D'Orbigny).**

Chætetes mammulatus Quenstedt (not D'Orbigny).

1881. Chætetes mammulatus. Quenstedt, Roehren- und Sternkorallen, p. 75, pl. cxlvi, 10, 11 (not 12).

Cincinnati (Richmond): Richmond, Indiana.

Obs. This is a species that has not yet been described.

Chætetes meeki James. See **Bythopora meeki (James).**

Chætetes ?? microscopicus Winchell.

1866. Chætetes microscopicus. Winchell, Rep. Low. Penin. Michigan, p. 90.

Hamilton: Petoskey, Michigan.

Chætetes ?? microscopicus Winchell—Continued.

1866. Obs. A valid species, but further investigation is needed to determine generic position.

Chætetes minutus James. See **Bythopora delicatula** (Nicholson).

Chætetes moniliformis Nicholson. See **Heterotrypa ? moniliformis** (Nicholson).

Chætetes monticulatus Hall. See **Monotrypa monticulata** (Hall).

Chætetes muscatinensis White. **Not a bryozoan.**

1876. Chætetes Muscatinensis. White, Proc. Acad. Nat. Sci. Philadelphia, p. 27.
Hamilton: Muscatine, Iowa.

Chætetes Newberryi Nicholson. See **Aspidopora newberryi** (Nicholson).

Chætetes nodulosus Nicholson. See **Callopora nodulosa** (Nicholson).

Chætetes ? O'Nealli James. See **Callopora onealli** (James).

Chætetes Ortoni Nicholson. See **Atactoporella ortoni** (Nicholson).

Chætetes papillatus Nicholson (not McCoy).

1874. Chætetes papillatus Nicholson (not McCoy). Nicholson, Quar. Jour. Geol. Soc. London, XXX, p. 513, pl. xxix, 12–12*b*.

1875. Chætetes papillatus (not McCoy). Nicholson, Pal. Ohio, II, p. 210.
Cincinnati: Cincinnati, Ohio.
Obs. The form so referred can not be identified with certainty from Nicholson's description and figures, but it was probably a species of Petigopora, possibly the P. asperula Ulrich.

Chætetes pavonia Milne-Edwards and Haime. See **Escharopora pavonia** (D'Orbigny).

Chætetes petechialis Nicholson. See **Petigopora petechialis** (Nicholson).

Chætetes petropolitanus James (not Pander).

1878. Chætetes petropolitanus. James, Paleontologist, No. 2, p. 11.
Cincinnati: Cincinnati, Ohio.
Obs. The form so referred by James is probably Amplexopora petasiformis (Nicholson).

Chætetes petropolitanus Meek and Worthen (not Pander).

1868. Chætetes petropolitanus Pander (?). Meek and Worthen, Geol. Surv. Illinois, III, p. 304, pl. ii, 8*a*, *b*.
Trenton: Scales Mound, Illinois.
Obs. Further investigation is needed to determine what the form is which Meek and Worthen referred as above.

Chætetes petropolitanus Nicholson (in part). See **Mesotrypa whiteavesi** (Nicholson).

Chætetes petropolitanus of various authors (not Pander).

Obs. A great variety of forms agreeing in having a discoid or hemispheric shape and differing, often greatly, in internal structure, has been confused under this name. Without an examination of the various specimens, no synonymy can be given.

Chætetes ?? ponderosus Rominger.

1892. Chætetes ponderosus. Rominger, American Geologist, X, p. 58, pl. iii, 4–8.
Hamilton: Falls of the Ohio.

Chætetes pulchellus Nicholson (not Milne-Edwards and Haime). See Callopora andrewsi (Nicholson).

Chætetes quadrangularis Nicholson. See Leptotrypa ? quadrangularis (Nicholson).

Chætetes quadratus Rominger. See Monotrypella quadrata (Rominger).

Chætetes ramosus Milne-Edwards and Haime. See Callopora ramosa (D'Orbigny).

Chætetes rhombicus Nicholson. See Monotrypella quadrata (Rominger).

Chætetes ?? rugosus Hall.

1847. Chætetes rugosus. Hall., Pal. New York, I, p. 67, pl. xxiv, 2*a*, *b*.
Trenton: Middleville, Herkimer County, New York.
Obs. The generic position can not be determined from the description and figures given.

Chætetes rugosus Milne-Edwards and Haime. See Callopora rugosa (Milne-Edwards and Haime).

Chætetes sigillarioides Nicholson. See Callopora onealli-sigillarioides (Nicholson).

Chætetes spherica Hall. See Monotrypa spherica (Hall).

Chætetes subglobosa Ulrich. See Monotrypa turbinata (James).

Chætetes subpulchellus Nicholson. See Heterotrypa subpulchella (Nicholson).

Chætetes subrotundus James. Not a bryozoan.

1878. Chætetes subrotundus. James, Paleontologist, No. 2, p. 11.

Chætetes tabulatus Hall. See Monotrypa tabulata (Hall).

Chætetes (Ptychonema) tabulatus Hall and Simpson. See Monotrypa tabulata (Hall).

Chætetes ?? tenuis Hall.

1876. Chætetes tenuis. Hall, Illus. Devonian Foss., pl. xxxvii, 6-10. (Not described.)
1892. Monotrypa tennis (in error for tenuis). Rominger, American Geologist, X, p. 60, pl. iii, 1-3.
Upper Helderberg: Genesee County, New York (Hall).
Hamilton: Falls of the Ohio (Rominger).

Chætetes tuberculatus Milne-Edwards and Haime. See Spatiopora tuberculata (Milne-Edwards and Haime).

Chætetes tuberculatus Nicholson (not Milne-Edwards and Haime). See Spatiopora corticans (Nicholson).

Chætetes turbinatum James. See Monotrypa turbinata (James).

Chætetes undulatus Nicholson. See Monotrypa undulata (Nicholson).

Chætetes varians James. See Batostoma varians (James).

Chætetes venustus Ulrich. See Crepipora venusta (Ulrich).

CHAINODICTYON Foerste. Genotype: Chainodictyon laxum Foerste.

1887. Chainodictyon. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 81.
1889. Chainodictyon. Miller, North American Geol. Pal., p. 297.
1890. Chainodictyon. Ulrich, Geol. Surv. Illinois, VIII, pp. 399, 640.

Chainodictyon laxum Foerste.

1887. Chainodictyon laxum. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 81, pl. vii, *8a–c*.

Lower Coal Measures: Flint Ridge, Ohio; Seville, Illinois.

Chainodictyon laxum-minor Ulrich.

1890. Chainodictyon laxum var. minor. Ulrich, Geol. Surv. Illinois, VIII, p. 640, pl. lxii, 3, *3a*.

Lower Coal Measures: Seville, Illinois.

Cheiloporella. See Chiloporella.

Cheilotrypa. See Chilotrypa.

CHILOPORELLA Ulrich. Genotype: Fistulipora flabellata Ulrich = Ceramopora Nicholsoni James.

1882. Cheiloporella. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 157.
1889. Chiloporella. Miller, North American Geol. Pal., p. 297.
1890. Chiloporella. Ulrich, Geol. Surv. Illinois, VIII, p. 381.
1897. Chiloporella. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 565.

Chiloporella flabellata Ulrich. See Chiloporella nicholsoni (James).

Chiloporella nicholsoni (James).

1875. Ceramopora Nicholsoni. James, Catal. Foss. Cincinnati Group, p. 3.
1888. Monticulipora (Fistulipora) nicholsoni. James and James, Jour. Cincinati Soc. Nat. Hist., XI, p. 34, pl. i, *6–6c*.
1896. Monticulipora (Fistulipora) nicholsoni. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 121, fig. 12.
1878. Fistulipora? multipora. James, Paleontologist, No. 1, p. 2.
1879. Fistulipora Siluriana. James, Paleontologist, No. 3, p. 19.
1879. Fistulipora flabellata. Ulrich, Jour. Cincinnati Soc. Nat. Hist., II, p. 28, pl. vii, *26–26b*.
1890. Chiloporella flabellata. Ulrich, Geol. Surv. Illinois, VIII, p. 381, pl. xxxix, *5–5b*.

Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.

CHILOTRYPA Ulrich. Genotype: Chilotrypa hispida Ulrich.

1884. Cheilotrypa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, p. 49.
1889. Chilotrypa. Miller, North American Geol. Pal., p. 297.
1890. Chilotrypa. Ulrich, Geol. Surv. Illinois, VIII, p. 382.
1896. Chilotrypa. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 269.
1897. Chilotrypa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 554.

Chilotrypa camerata (Hall).

1883. Trematopora camerata. Hall, Rep. State Geologist New York for the year 1882, pl. (26) xxiv, 9, 10.
1887. Diamesopora camerata. Hall and Simpson, Pal. New York, VI, p. 72, pl. xxvi, 9, 10.
1897. Diamesopora camerata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xvi, 3–5.

Upper Helderberg: Near Caledonia, New York.

Chilotrypa ? coalescens (Hall).

1852. Trematopora coalescens. Hall, Pal. New York, II, p. 150, pl. xlA, *2a*, *b*.

Niagara: Lockport, New York.

Chilotrypa constricta (Hall).

1874. Trematopora constricta. Hall, Twenty-sixth Ann. Rep. New York State Mus., p. 104.

1879. Trematopora ? constricta. Hall, Thirty-second Ann. Rep. New York State Mus., p. 150 (reprint, 1880, p. 12).

1883. Trematopora ? constricta. Hall, Rep. State Geologist New York for the year 1882, pl. x, 14–19.

1887. Diamesopora constricta. Hall and Simpson, Pal. New York, VI, p. 19, pl. x, 14–19, pl. xxiiiA, 7.

Lower Helderberg: Clarksville, New York.

Obs. See also Chilotrypa dispersa (Hall).

Chilotrypa dispersa (Hall).

1879. Trematopora dispersa. Hall, Thirty-second Ann. Rep. New York State Mus., p. 150 (reprint, 1880, p. 12).

1883. Trematopora dispersa. Hall, Rep. State Geologist New York for the year 1882, pl. x, 20, 21.

1887. Diamesopora dispersa. Hall and Simpson, Pal. New York, VI, p. 20, pl. x, 20, 21.

Lower Helderberg: Clarksville, New York.

Obs. The form is probably a synonym for Chilotrypa constricta (Hall).

Chilotrypa hispida (Ulrich).

1884. Cheilotrypa hispida. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, p. 50, pl. iii, 6–6*d*.

Chester: Sloans Valley, Grayson Springs, and Stephensport, Kentucky; Chester and many other localities in Illinois.

Chilotrypa ostiolata (Hall).

1852. Trematopora ostiolata. Hall, Pal. New York, II, p. 152, pl. xlA, 5*a–m*.

1875. Trematopora ostiolata. Nicholson, Pal. Province Ontario, p. 60, fig. 26. (Perhaps not the same form.)

1884. Cheilotrypa ostiolata. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, pl. iii, 7, 7*a*.

1897. Chilotrypa ostiolata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxi, 1, 2.

Niagara: Lockport and Rochester, New York; Hamilton and Niagara River, Ontario.

Chilotrypa varia (Hall).

1876. Trematopora varia. Hall, Twenty-eighth Ann. Rep. New York State Mus. (documentary edition), pl. x, 15–23; ibid. (Museum edition), 1879, p. 111, pl. x, 15–23.

1882. Trematopora varia. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 232, pl. ix, 15–23.

1890. Diamesopora varia. Ulrich, Geol. Surv. Illinois, VIII, p. 467.

Niagara: Waldron, Indiana.

Chilotrypa variolata (Hall).

1876. Trematopora variolata. Hall, Twenty-eighth Ann. Rep. New York State Mus. (documentary edition), pl. xi, 9, 10; ibid. (Museum edition, 1879), p. 113, pl. xi, 9, 10.

1882. Trematopora variolata. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 234, pl. x, 9, 10.

Niagara: Waldron, Indiana.

CLATHROPORA Hall. Genotype: Clathropora frondosa Hall.

1852. Clathropora. Hall, Pal. New York, II, p. 159.
1874. Clathropora. Nicholson, Geol. Mag., dec. 2, I, p. 124.
1874. Clathropora. Nicholson, Pal. Province Ontario, p. 111.
1882. Clathropora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 152.
1884. Clathropora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, p. 39.
1887. Clathropora. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 153.
1889. Clathropora. Miller, North American Geol. Pal., p. 297.
1890. Clathropora. Ulrich, Geol. Surv. Illinois, VIII, p. 392.
1896. Clathropora. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 279.
1897. Clathropora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 543.

Clathropora ? alcicornis Hall.

1852. Clathropora alcicornis. Hall, Pal. New York, II, p. 159, pl. xlB, *4a–c*.
Niagara: Lockport, New York.

Clathropora carinata Hall. See Coscinium cribriforme (Prout).

Clathropora clintonensis Hall and Whitfield. See Clathropora frondosa-clintonensis Hall and Whitfield.

Clathropora flabellata Hall. See Stictoporella flabellata (Hall).

Clathropora frondosa Hall.

1852. Clathropora frondosa. Hall, Pal. New York, II, p. 160, pl. xlB, *5a–e*.
1874. Clathropora frondosa. Nicholson and Hinde, Canadian Jour., new ser., XIV, p. 139.
1875. Clathropora frondosa. Nicholson, Pal. Province Ontario, p. 59.
1882. Clathropora frondosa. (Van Cleve) White, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 385, pl. lv, 3.
1887. Clathropora frondosa. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 154; ibid., III, 1888, pl. xv, 3.
1889. Clathropora frondosa. Miller, North American Geol. Pal., fig. 467 (p. 297).
1895. Clathropora frondosa. Foerste, Geol. Surv. Ohio, VII, p. 598, pl. xxviii, 3.
1897. Clathropora frondosa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 104 (p. 544).
Clinton: Dayton and Centerville, Ohio.
Niagara: Lockport, New York; Thorold, Ontario.

Clathropora frondosa-clintonensis Hall and Whitfield.

1875. Clathropora clintonensis. Hall and Whitfield, Pal. Ohio, II, p. 113, pl. v, 7.
1887. Clathropora clintonensis. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 154; ibid., III, 1888, pl. xv, 4.
1895. Clathropora clintonensis. Foerste, Geol. Surv. Ohio, VII, p. 598, pl. xxviii, 4.
Clinton: Dayton and Fair Haven, Ohio.

Clathropora ? gracilis Spencer. Not recognizable.

1884. Clathropora ? gracilis. Spencer, Trans. St. Louis Acad. Sci., IV, p. 604. pl. vii, 4.
1884. Clathropora ? gracilis. Spencer, Bull. Mus. State Univ. Missouri, I, p. 54, pl. vii, 4.
Niagara: Hamilton, Ontario.

Clathropora intermedia Nicholson and Hinde.

1874. Clathropora intermedia. Nicholson and Hinde, Canad. Jour., new ser., XIV, p. 140, fig. 5.

Chilotrypa constricta (Hall).

1874. Trematopora constricta. Hall, Twenty-sixth Ann. Rep. New York State Mus., p. 104.

1879. Trematopora ? constricta. Hall, Thirty-second Ann. Rep. New York State Mus., p. 150 (reprint, 1880, p. 12).

1883. Trematopora ? constricta. Hall, Rep. State Geologist New York for the year 1882, pl. x, 14–19.

1887. Diamesopora constricta. Hall and Simpson, Pal. New York, VI, p. 19, pl. x, 14–19, pl. xxiiiA, 7.

Lower Helderberg: Clarksville, New York.

Obs. See also Chilotrypa dispersa (Hall).

Chilotrypa dispersa (Hall).

1879. Trematopora dispersa. Hall, Thirty-second Ann. Rep. New York State Mus., p. 150 (reprint, 1880, p. 12).

1883. Trematopora dispersa. Hall, Rep. State Geologist New York for the year 1882, pl. x, 20, 21.

1887. Diamesopora dispersa. Hall and Simpson, Pal. New York, VI, p. 20, pl. x, 20, 21.

Lower Helderberg: Clarksville, New York.

Obs. The form is probably a synonym for Chilotrypa constricta (Hall).

Chilotrypa hispida (Ulrich).

1884. Cheilotrypa hispida. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, p. 50, pl. iii, 6–6*d*.

Chester: Sloans Valley, Grayson Springs, and Stephensport, Kentucky; Chester and many other localities in Illinois.

Chilotrypa ostiolata (Hall).

1852. Trematopora ostiolata. Hall, Pal. New York, II, p. 152, pl. xlA, 5*a*–*m*.

1875. Trematopora ostiolata. Nicholson, Pal. Province Ontario, p. 60, fig. 26. (Perhaps not the same form.)

1884. Cheilotrypa ostiolata. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, pl. iii, 7, 7*a*.

1897. Chilotrypa ostiolata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxi, 1, 2.

Niagara: Lockport and Rochester, New York; Hamilton and Niagara River, Ontario.

Chilotrypa varia (Hall).

1876. Trematopora varia. Hall, Twenty-eighth Ann. Rep. New York State Mus. (documentary edition), pl. x, 15–23; ibid. (Museum edition), 1879, p. 111, pl. x, 15–23.

1882. Trematopora varia. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 232, pl. ix, 15–23.

1890. Diamesopora varia. Ulrich, Geol. Surv. Illinois, VIII, p. 467.

Niagara: Waldron, Indiana.

Chilotrypa variolata (Hall).

1876. Trematopora variolata. Hall, Twenty-eighth Ann. Rep. New York State Mus. (documentary edition), pl. xi, 9, 10; ibid. (Museum edition, 1879), p. 113, pl. xi, 9, 10.

1882. Trematopora variolata. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 234, pl. x, 9, 10.

Niagara: Waldron, Indiana.

CLATHROPORA Hall. Genotype: Clathropora frondosa Hall.

1852. Clathropora. Hall, Pal. New York, II, p. 159.
1874. Clathropora. Nicholson, Geol. Mag., dec. 2, I, p. 124.
1874. Clathropora. Nicholson, Pal. Province Ontario, p. 111.
1882. Clathropora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 152.
1884. Clathropora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, p. 39.
1887. Clathropora. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 153.
1889. Clathropora. Miller, North American Geol. Pal., p. 297.
1890. Clathropora. Ulrich, Geol. Surv. Illinois, VIII, p. 392.
1896. Clathropora. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 279.
1897. Clathropora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 543.

Clathropora ? alcicornis Hall.

1852. Clathropora alcicornis. Hall, Pal. New York, II, p. 159, pl. xlB, 4*a–c*.
Niagara: Lockport, New York.

Clathropora carinata Hall. See Coscinium cribriforme (Prout).

Clathropora clintonensis Hall and Whitfield. See Clathropora frondosa-clintonensis Hall and Whitfield.

Clathropora flabellata Hall. See Stictoporella flabellata (Hall).

Clathropora frondosa Hall.

1852. Clathropora frondosa. Hall, Pal. New York, II, p. 160, pl. xlB, 5*a–e*.
1874. Clathropora frondosa. Nicholson and Hinde, Canadian Jour., new ser., XIV, p. 139.
1875. Clathropora frondosa. Nicholson, Pal. Province Ontario, p. 59.
1882. Clathropora frondosa. (Van Cleve) White, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 385, pl. lv, 3.
1887. Clathropora frondosa. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 154; ibid., III, 1888, pl. xv, 3.
1889. Clathropora frondosa. Miller, North American Geol. Pal., fig. 467 (p. 297).
1895. Clathropora frondosa. Foerste, Geol. Surv. Ohio, VII, p. 598, pl. xxviii, 3.
1897. Clathropora frondosa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 104 (p. 544).
Clinton: Dayton and Centerville, Ohio.
Niagara: Lockport, New York; Thorold, Ontario.

Clathropora frondosa-clintonensis Hall and Whitfield.

1875. Clathropora clintonensis. Hall and Whitfield, Pal. Ohio, II, p. 113, pl. v, 7.
1887. Clathropora clintonensis. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 154; ibid., III, 1888, pl. xv, 4.
1895. Clathropora clintonensis. Foerste, Geol. Surv. Ohio, VII, p. 598, pl. xxviii, 4.
Clinton: Dayton and Fair Haven, Ohio.

Clathropora ? gracilis Spencer. Not recognizable.

1884. Clathropora ? gracilis. Spencer, Trans. St. Louis Acad. Sci., IV, p. 604. pl. vii, 4.
1884. Clathropora ? gracilis. Spencer, Bull. Mus. State Univ. Missouri, I, p. 54, pl. vii, 4.
Niagara: Hamilton, Ontario.

Clathropora intermedia Nicholson and Hinde.

1874. Clathropora intermedia. Nicholson and Hinde, Canad. Jour., new ser., XIV, p. 140, fig. 5.

Clathropora intermedia Nicholson and Hinde—Continued.

1875. Clathropora intermedia. Nicholson, Pal. Province Ontario, p. 59, fig. 29*a*, *b*.
Niagara: Thorold, Ontario.

Clathropora intertexta Nicholson.

1874. Clathropora intertexta. Nicholson, Geol. Mag., new ser., I, p. 125, fig. 15.
1874. Clathropora intertexta. Nicholson, Pal. Province Ontario, p. 112, fig. 49.
1875. Clathropora intertexta. Nicholson, Pal. Province Ontario, p. 60.
1859. Coscinium cyclops. Prout (not Keyserling), Trans. St. Louis Acad. Sci., I, p. 268.
Upper Helderberg (Hamilton ?): Port Jarvis, Ontario; Utica, Indiana; Columbus, Ohio.

Clathropora striatura Hall. See Coscinium striaturum (Hall).

CLONOPORA Hall. Genotype: Clonopora semireducta Hall.

1883. Clonopora. Hall, Trans. Albany Institute, X, p. 162 (abstract, 1881, p. 20).
1887. Clonopora. Hall and Simpson, Pal. New York, VI, p. xxv.
1889. Clonopora. Miller, North American Geol. Pal., p. 298.
1897. Clonopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 598.

Clonopora fasciculata Hall and Simpson.

1887. Clonopora fasciculata. Hall and Simpson, Pal. New York, VI, p. 289, pl. lxvi, 1, 2.
Upper Helderberg: Onondaga Valley, New York.

Clonopora incurva Hall.

1883. Clonopora incurva. Hall, Trans. Albany Institute, X, p. 162 (abstract, 1881, p. 20).
1887. Clonopora incurva. Hall and Simpson, Pal. New York, VI, p. 289, pl. lxvi, 5, 6.
1897. Clonopora incurva. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxv, 6.
Upper Helderberg: Manlius, New York.

Clonopora semireducta Hall.

1883. Clonopora semireducta. Hall, Trans. Albany Institute, X, p. 162 (abstract, 1881, p. 20).
1887. Clonopora semireducta. Hall and Simpson, Pal. New York, VI, p. 289, pl. lxvi, 3, 4.
1897. Clonopora semireductus. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxv, 7.
Hamilton: Falls of the Ohio.

CŒLOCAULIS Hall and Simpson. Genotype: Callopora venusta Hall.

1887. Cœlocaulis (n. s. g.). Hall and Simpson, Pal. New York, VI, pp. xvi, 23.
1889. Cœlocaulis. Miller, North American Geol. Pal., p. 298.
1897. Cœlocaulis. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 554.

Cœlocaulis ?? aculeolata (Hall).

1883. Callopora aculeolata. Hall, Trans. Albany Institute, X, p. 149 (abstract, 1881, p. 7).
1883. Callopora aculeolata. Hall, Rep. State Geologist New York for the year 1882, pl. (26) xxiv, 16, 17.
1887. Callopora (Cœlocaulis) aculeolata. Hall and Simpson, Pal. New York, VI, p. 76, pl. xxvi, 16, 17.
Upper Helderberg: New York.

Cœlocaulis ?? hyale (Hall).

1874. Callopora Hyale. Hall, Twenty-sixth Ann. Rep. New York State Mus., p. 100.
1879. Callopora Hyale. Hall, Thirty-second Ann. Rep. New York State Mus., p. 155 (reprint, 1880, p. 17).
1883. Callopora Hyale. Hall, Rep. State Geologist New York for the year 1882, pl. xii, 18, 19.
1887. Callopora (Cœlocaulis) Hyale. Hall and Simpson, Pal. New York, VI, p. 76, pl. xii, 18, 19.

Upper Helderberg: Central New York.

Obs. This is probably a parasitic species of Fistulipora.

Cœlocaulis ? irregularis (Hall).

1883. Callopora irregularis. Hall, Trans. Albany Institute, X, p. 148 (abstract, 1881, p. 7).
1883. Trematopora (Callopora) irregularis. Hall, Rep. State Geologist New York for the year 1882, pl. (26) xxiv, 11-15.
1887. Callopora (Cœlocaulis) irregularis. Hall and Simpson, Pal. New York, VI, p. 76, pl. xxvi, 11-15.

Upper Helderberg: New York.

Cœlocaulis ? mediopora (Hall).

1879. Callopora parasitica (in part). Hall, Thirty-second Ann. Rep. New York State Mus., p. 157 (reprint, 1880, p. 19).
1883. Callopora parasitica (in part). Hall, Rep. State Geologist New York for the year 1882, pl. xiv, 18.
1887. Callopora (Cœlocaulis) mediopora. Hall and Simpson, Pal. New York, VI, p. 23, pl. xiv, 18, pl. xxiii A, 11-13.

Lower Helderberg: Near Clarksville, New York.

Cœlocaulis venusta (Hall).

1874. Callopora venusta. Hall, Twenty-sixth Ann. Rep. New York State Mus., p. 101.
1879. Callopora venusta. Hall, Thirty-second Ann. Rep. New York State Mus., p. 155 (reprint, 1880, p. 17).
1883. Callopora venusta. Hall, Rep. State Geologist New York for the year 1882, pl. xii, 20-24.
1887. Callopora (Cœlocaulis) venusta. Hall and Simpson, Pal. New York, VI, p. 23, pl. xii, 20-24; pl. xxiii A, 1-3, ? 4, 5.
1897. Cœlocaulis venusta. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxi, 3-5.

Lower Helderberg: Clarksville, New York.

CŒLOCLEMA Ulrich. Genotype: Diamesopora vaupeli Ulrich = Ceramopora alternata James.

1882. Cœloclema. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 137; ibid., VII, 1884, p. 49. (Not defined.)
1890. Diamesopora (in part). Ulrich, Geol. Surv. Illinois, VIII, pp. 380, 467.
1893. Diamesopora (in part). Ulrich, Geol. Minnesota, III, p. 330.
1896. Diamesopora. Ulrich, Zittel's Textb. Pal. (Eng. ed.), p. 268.

Obs. Cœloclema Ulrich (not defined) was abandoned in favor of Diamesopora Hall, under the mistaken belief that Diamesopora dichotoma Hall was congeneric with the D. vaupeli Ulrich. As our generic diagnoses show, the two genera are not at all related.

Cœloclema alternatum (James).

1878. Ceramopora alternata. James, Paleontologist, No. 1, p. 5.

Cœloclema alternatum (James)—Continued.

1888. Monticulipora (Fistulipora) alternata. James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 34, pl. i, 5–5*b*.

1890. Diamesopora vaupeli. Ulrich, Geol. Surv. Illinois, VIII, p. 468, pl. xxxix, 3, 3*b*, pl. xli, 4–4*c*.

Cincinnati (Utica): Cincinnati, Ohio, and vicinity.

Cœloclema concentricum (James).

1878. Ceramopora concentrica. James, Paleontologist, No. 1, p. 5.

1888. Ceramopora concentrica. James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 38, pl. i, 8, 8*a*.

1890. Diamesopora communis. Ulrich, Geol. Surv. Illinois, VIII, p. 469, pl. xxxix, 3*a*, pl. xli, 5–5*b*.

Cincinnati (Utica): Cincinnati, Ohio, and vicinity.

Cœloclema imbricata Ulrich. See Diamesopora subimbricata (Hall).

Cœloclema infrequens Ulrich. See Diamesopora infrequens (Hall).

Cœloclema osculum Ulrich. See Diamesopora osculum (Hall).

Cœloclema oweni (James).

1884. Fistulipora oweni. James, Jour. Cincinnati Soc. Nat. Hist., VII, p. 21, fig. 2–2*g*.

1888. Monticulipora (Fistulipora) oweni. James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 34.

1890. Diamesopora oweni. Ulrich, Geol. Surv. Illinois, VIII, p. 467.

1896. Monticulipora (Fistulipora) oweni. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 119.

Cincinnati (Lorraine): Lebanon, Hamilton, and Cincinnati, Ohio.

Cœloclema trentonense (Ulrich).

1893. Diamesopora trentonensis. Ulrich, Geol. Minnesota, III, p. 330, pl. xxviii, 14.

1896. Diamesopora trentonensis. Ulrich, Zittel's Textb. Pal. (Engl. ed.), fig. 439 (p. 268).

Trenton: St. Paul and Cannon Falls, Minnesota; Trenton Falls, New York; Ottawa, Canada.

CŒLOCONUS Ulrich. Genotype: Cœloconus rhombicus Ulrich.

1890. Cœloconus. Ulrich, Geol. Surv. Illinois, VIII, pp. 402, 664.

1889. Cœloconus. (Ulrich, in press), Miller, North American Geol. Pal., p. 298.

1896. Cœloconus. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 281.

1897. Cœloconus. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 549.

Cœloconus granosus Ulrich.

1890. Cœloconus granosus. Ulrich, Geol. Surv. Illinois, VIII, p. 665, pl. lxxii, 3–3*b*.

1897. Cœloconus granosus. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 117 (p. 549).

Chester: Anna, Chester, and Red Bud, Illinois.

Cœloconus rhombicus Ulrich.

1890. Cœloconus rhombicus. Ulrich, Geol. Surv. Illinois, VIII, p. 664, pl. lxxii, 4–4c.

1897. Cœloconus rhombicus. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 118 (p. 549).

Warsaw: Near Waterloo, Illinois.

CONSTELLARIA Dana. Genotype: Ceriopora constellata (Van Cleve (Mss.)) Dana.

1846. Constellaria. Dana, Zoophyta, p. 537.
1875. Constellaria. Nicholson, Pal. Ohio, II, p. 214.
1879. Constellaria. Nicholson, Pal. Tab. Corals, p. 292.
1881. Constellaria. Nicholson, Genus Monticulipora, p. 97.
1882. Constellaria. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 156.
1883. Constellaria. Ulrich, Jour. Cincinnati Soc. Nat., Hist., VI, p. 265.
1888. Constellaria. James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 29.
1890. Constellaria. Ulrich, Geol. Surv. Illinois, VIII, pp. 374, 423.
1893. Constellaria. Ulrich, Geol. Minnesota, III, p. 311.
1896. Constellaria. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 276.
1896. Constellaria. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 117.
1860. Stellipora. Milne-Edwards, Hist. Nat. des Corall., III, p. 281.
1877. Stellipora (in part). Dybowski, Die Chæteiden d. Ostbalt. Silur-Form., p. 42.

Constellaria antheloidea of various authors (not Hall). See Constellaria constellata (Van Cleve) Dana.

Constellaria constellata (Van Cleve) Dana.

——. Ceriopora constellata. Van Cleve (Mss.), Plates of Fossils.
1846. Constellaria constellata. Dana, Zoophyta, p. 537, pl. lii, *6a*, *b*.
1881. Chætetes constellatus. Quenstedt, Roehren- und Sternkorallen, p. 79, pl. cxlvi, 21–25.
1850. Stellipora antheloidea (not of Hall). D'Orbigny, Prodr. de Pal., I, p. 22.
1851. Constellaria antheloidea (not of Hall). Milne-Edwards and Haime, Pol. Foss. Terr. Pal., p. 279, pl. xx, 7, *7b*.
1860. Stellipora antheloidea (not of Hall). Milne-Edwards, Hist. Nat. des Corall., III, p. 281.
1866. Hellipora (Constellaria) antheloidea (not of Hall). Rominger, Proc. Acad. Nat. Sci. Philadelphia, p. 118.
1875. Constellaria antheloidea (not of Hall). Nicholson, Pal. Ohio, II, p. 214.
1876. Constellaria antheloidea (not of Hall). Nicholson, Ann. Mag. Nat. Hist., ser. 4, XVIII, p. 92, pl. v, 10.
1878. Constellaria antheloidea (not of Hall). James, Paleontologist, No. 2, p. 13.
1879. Constellaria antheloidea (not of Hall). Nicholson, Pal. Tab. Corals, p. 301, pl. xiv, 5, *5b*.
1882. Constellaria antheloidea (not of Hall). (Van Cleve) White, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 379, pl. xlvi, 1–3.
1882. Constellaria florida. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 257; ibid., VI, 1883, p. 267, pl. xiv, 2–*2f*.
1896. Constellaria florida. Ulrich, Zittel's Textb. Pal. (Engl. ed.), fig. 461 (p. 276).
1888. Monticulipora (Constellaria) polystomella (not of Nicholson), (in part). James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 30.
1896. Monticulipora (Constellaria) polystomella (not of Nicholson), (in part). J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 118.

Cincinnati (Lorraine): Cincinnati, Ohio. A common fossil in the Lorraine beds of Ohio, Indiana, Kentucky, and Tennessee.

Constellaria constellata-plana Ulrich.

1883. Constellaria florida var. plana. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 269, pl. xiv, 4.

Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.

Constellaria constellata-prominens Ulrich.

1883. Constellaria florida var. prominens. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 269, pl. xiv, 3.

Cincinnati (Utica and Lorraine): Cincinnati, Ohio, and vicinity.

Constellaria fischeri Ulrich.

1883. Constellaria fischeri. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 270, pl. xiv, 6–6*c*.

Trenton: Winchester, Kentucky; Nashville, Tennessee. Formation and locality are given erroneously with the description.

Constellaria florida Ulrich. See Constellaria constellata (Van Cleve) Dana.

Constellaria florida var. plana Ulrich. See Constellaria constellata-plana Ulrich.

Constellaria florida var. prominens Ulrich. See Constellaria constellata-prominens Ulrich.

Constellaria limitaris (Ulrich).

1879. Stellipora limitaris. Ulrich, Jour. Cincinnati Soc. Nat. Hist., II, p. 126, pl. xii, 8–8*c*.

1883. Constellaria limitaris. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 269, pl. xiv, 5, 5*a*.

Cincinnati (Richmond): Clarksville, Blanchester, Waynesville, and other localities in Ohio; Versailles and Weisburg, Indiana.

Constellaria parva Ulrich.

1890. Constellaria parva. Ulrich, Geol. Surv. Illinois, VIII, p. 424, pl. xxxiv, 1–1*b*.

1896. Monticulipora (Constellaria) parva. J. F. James, Jour. Cincinnati Soc. Nat. Hist. XVIII, p. 119.

Cincinnati (Richmond): Wilmington, Illinois.

Constellaria polystomella Nicholson.

1875. Constellaria polystomella. Nicholson, Pal. Ohio, II, p. 215, pl. xxii, 7, 7*a*.

1882. Constellaria polystomella. Whitfield, Geol. Surv. Wisconsin, IV, p. 257, pl. xii, 3, 4.

1896. Monticulipora (Constellaria) polystomella (in part). J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 118.

Cincinnati (Richmond): Delafield, Wisconsin; Wilmington, Illinois; Richmond and Versailles, Indiana; Blanchester, Waynesville, and other localities in Ohio.

Obs. Nicholson erroneously records this characteristic fossil of the Richmond beds as from Cincinnati, Ohio.

Constellaria punctata (Whitfield).

1878. Monticulipora punctata. Whitfield, Ann. Rep. Wisconsin Geol. Surv. for 1887, p. 71.

1882. Monticulipora punctata. Whitfield, Geol. Surv. Wisconsin, IV, p. 249, pl. xi, 3, 4.

Cincinnati (Richmond): Delafield and Iron Ridge, Wisconsin.

Constellaria varia Ulrich.

1893. Constellaria varia. Ulrich, Geol. Minnesota, III, p. 311, pl. xxi, 1–7.

Trenton: Cannon Falls, Minnesota; Belleville, Canada; Belfast, Tennessee.

COSCINELLA Hall and Simpson. Genotype: Coscinella elegantula Hall and Simpson.

1887. Coscinella. Hall and Simpson, Pal. New York, VI, p. xix.
1889. Coscinella. Miller, North American Geol. Pal., p. 298.
1897. Coscinella. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 534.

Obs. Ulrich unites this genus with Intrapora. It seems better to hold it for forms agreeing with Intrapora in zoœcial structure, but differing in the mode of growth by forming a regular network of anastomosing branches with rounded fenestrules.

Coscinella cosciniformis (Nicholson).

1875. Ptilodictya cosciniformis. Nicholson, Geol. Mag., new ser., II, p. 35, pl. ii, 2–2*b*.
1875. Ptilodictya cosciniformis. Nicholson, Pal. Province Ontario, p. 80, pl. ii, 2*a*, 2*b*.
1887. Coscinium cosciniforme. Hall and Simpson, Pal. New York, VI, p. 239.
Hamilton: Arkona, Ontario.
1889. Coscinella cosciniformis. Miller, North American Geol. Pal., p. 298.
1890. Intrapora cosciniformis. Ulrich, Geol. Surv. Illinois, VIII, p. 532, pl. xliii, 6, 6*a*.
1898. Intrapora cosciniformis. Whiteaves, Contr. Canad. Pal., I, p. 376.

Coscinella elegantula Hall and Simpson.

1887. Coscinella elegantula. Hall and Simpson, Pal. New York, VI, p. 239, pl. lxiv, 9–12.
1897. Coscinella elegantula. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xiv, 7–12.
1898. Intrapora elegantula. Whiteaves, Contr. Canad. Pal., I, p. 376.
Hamilton: Widder, Ontario.

COSCINIUM Keyserling. Genotype: Coscinium cyclops Keyserling.

1846. Coscinium. Keyserling, Reise in das Petschora Land, p. 191.
1858. Coscinium. Prout, Trans. St. Louis Acad. Sci., I, p. 266.
1860. Coscinium. Eichwald, Lethæa Rossica, I, p. 397.
1884. Coscinium. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, p. 38.
1887. Coscinium. Hall and Simpson, Pal. New York, VI, p. xix.
1889. Coscinium. Miller, North American Geol. Pal., p. 298.
1890. Coscinium. Ulrich, Geol. Surv. Illinois, VIII, pp. 385, 496.
1897. Coscinium. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 537.
1887. Coscinotrypa. Hall and Simpson, Pal. New York, VI, p. xix.
1889. Coscinotrypa. Miller, North American Geol. Pal., p. 298.
1897. Coscinotrypa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 537.

Coscinium asterias Prout. See Fistulipora asteria (Prout).

Coscinium cosciniforme Hall and Simpson. See Coscinella cosciniformis (Nicholson).

Coscinium cribriforme Prout.

1859. Coscinium cribriformis. Prout, Trans. St. Louis Acad Sci., I, p. 269, pl. xvi, 1, 1*a*.
1890. Coscinium cribriforme. Ulrich, Geol. Surv. Illinois, VIII, p. 496, pl. xliii, 8.
1897. Coscinotrypa cribriformis. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xiii, 1–7.

Coscinium cribriforme Prout—Continued.

1884. Coscinium cyclops (not of Keyserling). Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, p. 38, pl. ii, 6.
1883. Clathropora carinata. Hall, Rep. State Geologist New York for the year 1882, pl. xxvi, 22–25.
1886. Coscinotrypa carinata. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxix, 29–35.
1887. Coscinotrypa cribriformis var. carinata. Hall and Simpson, Pal. New York, VI, p. 89, pl. xxix, 29–35, pl. xxxiii, 22–25.
Hamilton: Falls of the Ohio; Utica, Indiana.

Coscinium cyclops Prout (not Keyserling). See Clathropora intertexta Nicholson.

Coscinium cyclops Ulrich (not Keyserling). See Coscinium cribriforme Prout.

Coscinium dictyotum (Meek).

1873. Ptilodictya (Stictopora?) dictyota. Meek, Hayden's Sixth Ann. Rep. U. S. Geol. Surv., p. 465.
Carboniferous: Mystic Lake, Montana.

Coscinium elegans Prout. See Glyptopora elegans (Prout).

Coscinium escharense Prout. Not recognizable.

1859. Coscinium escharense. Prout, Trans. St. Louis Acad. Sci., I, p. 574.
1866. Coscinium escharense. Prout, Geol. Surv. Illinois, II, p. 416, pl. xxii, 8, 8*a*.
1884. Lichenalia escharense. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, p. 40.
Keokuk: Warsaw, Illinois.

Coscinium keyserlingi Prout. See Glyptopora keyserlingi (Prout).

Coscinium latum Ulrich.

1890. Coscinium latum. Ulrich, Geol. Surv. Illinois, VIII, p. 497, pl. lxxvi, 7–7*b*.
1894. Coscinium? latum. Keyes, Missouri Geol. Surv., V, p. 18.
Burlington: Calhoun County and Quincy, Illinois; Burlington, Iowa.

Coscinium Michelinia Prout. See Glyptopora michelinia (Prout).

Coscinium plumosum Prout. See Glyptopora plumosa (Prout) and Glyptopora sagenella-caliculosa Ulrich.

Coscinium saganella Prout. See Glyptopora sagenella (Prout).

Coscinium striatum Hall and Simpson.

1887. Coscinium striatum. Hall and Simpson, Pal. New York, VI, p. 238, pl. lxiv, 13–16.
1897. Coscinium striatum. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xiii, 8–12.
1898. Coscinium striatum. Whiteaves, Contr. Canad. Pal., I, Part V, p. 377.
Hamilton: Widder, Ontario.

Coscinium striaturum (Hall).

1883. Clathropora striatura. Hall, Rep. State Geologist New York for the year 1882, pl. (33) xxvi, 20, 21.
1887. Coscinium striaturum. Hall and Simpson, Pal. New York, VI, p. 88, pl. xxxiii, 20, 21.
1897. Coscinium striaturum. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xiv, 1.
Upper Helderberg: Stafford, New York.

*Coscinium tu*berculatum Prout. See Fistulipora? tuberculata (Prout).

Coscinium wortheni Prout.

1860. Coscinium Wortheni. Prout, Trans. St. Louis Acad. Sci., I, p. 571.

1866. Coscinium Wortheni. Prout, Geol. Surv. Illinois, II, p. 412, pl. xxii, 1.

Keokuk: Near Warsaw, Illinois.

Obs. If recognizable at all, probably an abnormal example of Glyptopora keyserlingi (Prout).

Coscinotrypa Hall. See Coscinium Keyserling.

Coscinotrypa carinata Hall. See Coscinium cribriforme Prout.

Coscinotrypa cribriformis Simpson. See Coscinium cribriforme Prout.

Coscinotrypa cribriformis var. carinata Hall. See Coscinium cribriforme Prout.

Crateripora Ulrich.

1879. Crateripora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., II, p. 29.

Obs. The forms for which this genus was proposed have been found to be the basal articulating sockets of species of Escharopora and Arthropora.

Crateripora erecta Ulrich. See Arthropora shafferi (Meek).

Crateripora lineata Ulrich. See Escharopora falciformis (Nicholson).

Crateripora lineata var. expansa Ulrich. See Escharopora falciformis (Nicholson).

CREPIPORA Ulrich. Genotype: Crepipora simulans Ulrich.

1882. Crepipora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 157.

1889. Crepipora. Miller, North American Geol. Pal., p. 299.

1890. Crepipora. Ulrich, Geol. Surv. Illinois, VIII, pp. 380, 469.

1893. Crepipora. Ulrich, Geol. Minnesota, III, p. 322.

1896. Crepipora. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 268.

1897. Crepipora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 566.

Crepipora epidermata Ulrich. See Bythotrypa epidermata (Ulrich).

Crepipora hemispherica Ulrich.

1890. Crepipora hemispherica. Ulrich, Geol. Surv. Illinois, VIII, p. 472, pl. xl, 5–5*b*.

Cincinnati (Richmond): Wilmington, Illinois; Delafield, Wisconsin.

Crepipora impolita Ulrich. See Anolotichia impolita (Ulrich).

Crepipora impressa Ulrich.

1890. Crepipora impressa. Ulrich, Geol. Surv. Illinois, VIII, p. 471, pl. xl, 2, 2*a*.

1897. Crepipora impressa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 135, 136 (p. 566).

Cincinnati (Lorraine): Covington, Kentucky.

Crepipora perampla Ulrich.

1893. Crepipora perampla. Ulrich, Geol. Minnesota, III, p. 323, pl. xxviii, 29–32.

1896. Crepipora perampla. Ulrich, Zittel's Textb. Pal. (Engl. ed.), fig. 436A–C (p. 267).

Trenton (Stones River): Chatfield and Spring Valley, Minnesota.

Crepipora simulans Ulrich.

1890. Crepipora simulans. Ulrich, Geol. Surv. Illinois, VIII, p. 470, pl. xxxix, 4, 4*a*, pl. xl, 3, 3*a*; fig. 8*b* (p. 320).

1889. Crepipora simulans. (Ulrich, in press), Miller, North American Geol. Pal., fig. 468 (p. 299).

Crepipora simulans Ulrich—Continued.

1896. Crepipora simulans. Ulrich, Zittel's Textb. Pal. (Engl. ed.), fig. 436D (p. 267).

1897. Crepipora simulans. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 133, 134 (p. 566).

Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity. A rather common species in the Lorraine beds of Ohio, Indiana, Kentucky, and Tennessee. The same species or closely related varieties occur in the Trenton of Kentucky and Tennessee, and in the Richmond of Ohio, Indiana, Illinois, Wisconsin, and Kentucky.

Crepipora solida Ulrich.

1890. Crepipora solida. Ulrich, Geol. Surv. Illinois, VIII, p. 472, pl. xl, 4–4*b*.

Cincinnati (Utica): Covington, Kentucky.

Crepipora spatiosa Ulrich.

1893. Crepipora spatiosa. Ulrich, Geol. Minnesota, III, p. 323.

Trenton: Harrodsburg and Frankfort, Kentucky.

Crepipora subæquata Ulrich.

1893. Crepipora subæquata. Ulrich, Geol. Minnesota, III, p. 322, pl. xxviii, 26–28.

Trenton (Black River): St. Paul, Minnesota.

Crepipora venusta (Ulrich).

1878. Chætetes venustus. Ulrich, Jour. Cincinnati Soc. Nat. Hist., I, p. 93, pl. iv, 7, 7*a*.

1882. Crepipora venusta. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 257.

1888. Monticulipora (Fistulipora) venusta. James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 33.

Trenton and Cincinnati (Utica): Covington and Newport, Kentucky; Cincinnati, Ohio.

Crisina ? scrobiculata Hall. See Crisinella scrobiculata (Hall).

CRISINELLA Hall. Genotype: Crisina ? scrobiculata Hall.

1883. Crisinella. Hall, Rep. State Geologist New York for the year 1882, expl. pl. (33) xxvi.

1887. Crisinella. Hall and Simpson, Pal. New York, VI, p. xxv.

1889. Crisinella. Miller, North American Geol. Pal., p. 299.

1897. Crisinella. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 526.

Crisinella scrobiculata (Hall).

1883. Crisina ? scrobiculata. Hall, Trans. Albany Institute, X, p. 162 (abstract, 1881, p. 20).

1883. Crisinella scrobiculata. Hall, Rep. State Geologist New York for the year 1882, pl. (33) xxvi, 6–8.

1887. Crisinella scrobiculata. Hall and Simpson, Pal. New York, VI, p. 103, pl. xxxiii, 6–8.

1897. Crisinella scrobiculata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. ix, 1-3.

Upper Helderberg: Western New York.

Cryptopora Nicholson. See Semicoscinium Prout.

Cryptopora mirabilis Nicholson. See Semicoscinium mirabile (Nicholson).

CYCLOPORA Prout. Genotype: Cyclopora fungia Prout.
1860. Cyclopora. Prout, Trans. St. Louis Acad. Sci., I, p. 574.
1866. Cyclopora. Prout, Geol. Surv. Illinois, II, p. 417.
1889. Cyclopora. Miller, North American Geol. Pal., p. 299.
1890. Cyclopora. Ulrich, Geol. Surv. Illinois, VIII, pp. 403, 671.
1897. Cyclopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 601.

Cyclopora discoidea Prout. See Proutella discoidea (Prout).

Cyclopora expatiata Ulrich.
1890. Cyclopora expatiata. Ulrich, Geol. Surv. Illinois, VIII, p. 673, pl. lxviii, 4-4*d*.
1894. Cyclopora expatiata. Keyes, Missouri Geol. Surv., V, p. 37.
Keokuk: Warsaw and Nauvoo, Illinois.

Cyclopora fungia Prout.
1860. Cyclopora fungia. Prout, Trans. St. Louis Acad. Sci., I, p. 577.
1866. Cyclopora fungia. Prout. Geol. Surv. Illinois, II, p. 419, pl. xxii, 9-9*b*.
1890. Cyclopora fungia. Ulrich, Geol. Surv. Illinois, VIII, p. 671, pl. lxviii, 3-3*g*.
1894. Cyclopora fungia. Keyes, Missouri Geol. Surv., V, p. 36.
1897. Cyclopora fungia. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 210-213 (p. 601).
Keokuk and Warsaw: St. Francisville, Missouri (Prout); a common species at many localities in Illinois and Iowa.

Cyclopora Jamesii Prout. See Escharopora pavonia (D'Orbigny).

Cyclopora polymorpha Prout. See Stenopora tuberculata (Prout).

CYCLOPORELLA Ulrich. Genotype: Cycloporella spinifera Ulrich.
1890. Cycloporella. Ulrich, Geol. Surv. Illinois, VIII, pp. 404, 675.
1889. Cycloporella. (Ulrich, in press), Miller, North American Geol. Pal., p. 299.

Cycloporella ? perversa Ulrich.
1890. Cycloporella ? perversa. Ulrich, Geol. Surv. Illinois, VIII, p. 676, pl. lxix, 3-3*b*.
1894. Cycloporella perversa. Keyes, Missouri Geol. Surv., V, p. 37.
Keokuk: Warsaw and Greene counties, Illinois; Bentonsport, Iowa.

Cycloporella spinifera Ulrich.
1890. Cycloporella spinifera. Ulrich, Geol. Surv. Illinois, VIII, p. 675, pl. lxix, 1-1*c*.
1894. Cycloporella spinifera. Keyes, Missouri Geol. Surv., V, p. 37.
Keokuk: Warsaw, Illinois.

Cycloporina Simpson. See Semicoscinium Prout.

Cycloporina hemicycla Simpson. See Semicoscinium labiatum (Hall).

Cycloporina rhomboidea Simpson. See Semicoscinium semirotundum (Hall).

Cycloporina semirotunda Simpson. See Semicoscinium semirotundum (Hall).

CYCLOTRYPA Ulrich. Genotype: Fistulipora communis Ulrich.
1890. Nov. gen. (?). Ulrich, Geol. Surv. Illinois, VIII, p. 382.
1896. Cyclotrypa. Ulrich, Zittel's Textb. Pal., (Engl. ed.), p. 269.

Cyclotrypa collina (Ulrich).

1890. Fistulipora collina. Ulrich, Geol. Surv. Illinois, VIII, p. 478, pl. xlvii, 6–6*b*, pl. xlviii, 5, 5*a*.
1896. Cyclotrypa collina. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 269.
Hamilton: Buffalo, Iowa.

Cyclotrypa communis (Ulrich).

1890. Fistulipora communis. Ulrich, Geol. Surv. Illinois, VIII, p. 476, pl. xlvii, 1, 1*a*, pl. xlviii, 1, 1*a*.
1896. Cyclotrypa communis. Ulrich, Zittel's Textb. Pal. (Engl. ed.), fig. 443 (p. 269).
Hamilton: Buffalo, Iowa; Rock Island, Illinois.

CYSTODICTYA Ulrich. Genotype: Cystodictya ocellata Ulrich.

1882. Cystodictya. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, pp. 152, 170.
1884. Cystodictya. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, p. 35.
1887. Cystodictya. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 74.
1889. Cystodictya. Miller, North American Geol. Pal., p. 299.
1890. Cystodictya. Ulrich, Geol. Surv. Illinois, VIII, pp. 385, 491.
1896. Cystodictya. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 280.
1897. Cystodictya. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 536.
1883. Arcanopora. Vine, Fifty-third Rep. British Assoc. Adv. Sci., p. 204.
1887. Stictopora (not of Hall, 1847). Hall and Simpson, Pal. New York, VI, p. xx.
1897. Stictocella. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 532.

Cystodictya americana Ulrich.

1890. Cystodictya americana. Ulrich, Geol. Surv. Illinois, VIII, p. 494, pl. lxxvi, 5, 5*a*.
1894. Cystodictya americana. Keyes, Missouri Geol. Surv., V, p. 17.
Keokuk: Kings Mountain, Kentucky; Bentonsport, Iowa.

Cystodictya angularis (Hall and Simpson).

1887. Stictopora angularis. Hall and Simpson, Pal. New York, VI, p. 252, pl. lxi, 23.
1891. Stictopora angularis. Hall, Tenth Ann. Rep. State Geologist New York for the year 1890, p. 46; Forty-fourth Ann. Rep. New York State Mus., p. 76.
Hamilton: Near Le Roy, New York.
Obs. Probably a synonym for Cystodicta tumulosa (Hall and Simpson).

Cystodictya angusta Ulrich.

1888. Cystodictya angusta. Ulrich, Bull. Denison Univ., IV, p. 82, pl. xiv, 20.
Waverly: Moot's Run, Ohio.

Cystodictya bifurcata (Hall and Simpson).

1887. Stictopora bifurcata. Hall and Simpson, Pal. New York, VI, p. 254, pl. lxiii, 17.
1891. Stictopora bifurcata. Hall, Tenth Ann. Rep. State Geologist New York for the year 1890, p. 47; Forty-fourth Ann. Rep. New York State Mus., p. 77.
1889. Stictopora bristolensis. Miller, North American Geol. Pal., p. 323.
Hamilton: Near Muttonville, Ontario County, New York.

Cystodictya carbonaria (Meek).

1871. Ptilodictya (Stictopora) carbonaria. Meek, Proc. Acad. Nat. Sci. Philadelphia, p. 160.

Cystodictya carbonaria (Meek)—Continued.

1875. Ptilodictya (Stictopora) carbonaria. Meek, Pal. Ohio, II, p. 328, pl. xx, 3*a*, *b*.

1882. Cystodictya carbonaria. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 171.

1887. Cystodictya carbonaria. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 74, pl. vii, 2*a*–*c*.

Coal Measures: Newark and Bald Hill, Ohio; Seville, Illinois.

Cystodictya ? concentrica (Prout).

1858. Eschara? concentrica. Prout, Trans. St. Louis Acad. Sci., I, p. 234.

Carboniferous: Organ Mountains, New Mexico.

Cystodictya crenulata Ulrich. See Cystodictya subrigida (Hall).

Cystodictya crescens (Hall).

1886. Stictopora crescens. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxvii, 5–11.

1887. Stictopora crescens. Hall and Simpson, Pal. New York, VI, p. 91, pl. xxvii, 5–11.

1890. Cystodictya crescens. Ulrich, Geol. Surv. Illinois, VIII, p. 492.

1897. Stictopora crescens. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. x, 9, 10.

Upper Helderberg: Ontario.

Cystodictya gilberti (Meek).

1871. Ptilodictya (Stictopora) Gilberti. Meek, Proc. Acad. Nat. Sci. Philadelphia, p. 63.

1873. Ptilodictya (Stictopora) Gilberti. Meek, Pal. Ohio, I, p. 194, pl. xviii, 1*a*–*c*.

1875. Ptilodictya Gilberti. Nicholson, Pal. Province Ontario, p. 80.

1882. Cystodictya gilberti. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 168. pl. viii, 2, 2*a*; ibid., VII, 1884, p. 36, pl. ii, 5–5*b*.

1883. Stictopora Gilberti. Hall, Trans. Albany Institute, X, p. 155 (abstract, 1881, p. 13).

1883. Stictopora Gilberti. Hall, Rep. State Geologist New York for the year 1882, pl. (28) xxv, 21, 22.

1886. Stictopora Gilberti. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxvii, 20–35.

1887. Stictopora Gilberti. Hall and Simpson, Pal. New York, VI, p. 90, pl. xxvii, 20–35, pl. xxviii, 21, 22.

1890. Cystodictya gilberti. Ulrich, Geol. Surv. Illinois, VIII, fig. 8*e* (p. 320), pl. xliii, 7.

1897. Cystodictya gilberti. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. x, 12–17.

1881. Stictopora crispata. Quenstedt, Roehren- und Sternkorallen, p. 173, pl. cl, 3*s*.

Upper Helderberg: Sylvania and Marblehead, Ohio (Meek); Jarvis, Ontario, (Nicholson).

Hamilton: Falls of the Ohio; Utica, Indiana.

Cystodictya hamiltonensis Ulrich.

1890. Cystodictya hamiltonensis. Ulrich, Geol. Surv. Illinois, VIII, p. 493, pl. xlii, 4, pl. xliii, 1.

1892. Cystodictya Hamiltonensis. Whiteaves, Contr. Canadian Pal. I, p. 279, pl. xxxvi, 2–2*b*.

Hamilton: Buffalo, Iowa; Rock Island, Illinois; Milwaukee, Wisconsin; Eighteen-Mile Creek, New York; several localities in Manitoba (Whiteaves).

Cystodictya incisurata (Hall).

1883. Stictopora incisurata. Hall, Trans. Albany Institute, X, p. 189 (abstract, 1881, p. 189).
1884. Stictopora incisurata. Hall, Rep. State Geologist New York for the year 1883, p. 38.
1887. Stictopora incisurata. Hall and Simpson, Pal. New York, VI, p. 241, pl. lx, 1–18.
1890. Cystodictya incisurata. Ulrich, Geol. Surv. Illinois, VIII, p. 492.
1897. Cystodictya incisurata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. x, 11.
1898. Cystodictya incisurata. Whiteaves, Contr. Canadian Pal., I, p. 377.
1899. Stictopora incisurata. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 172, fig. 67.
1883. Stictopora indenta. Hall, Trans. Albany Institute, X, p. 189 (abstract, 1881, p. 189).
1884. Stictopora indenta. Hall, Rep. State Geologist New York for the year 1883, p. 40.
1883. Stictopora obliqua. Hall, Trans. Albany Institute, X, p. 189 (abstract, 1881, p. 189).
1884. Stictopora obliqua. Hall, Rep. State Geologist New York for the year 1883, p. 39.
1883. Stictopora multipora. Hall, Trans. Albany Institute, X, p. 190 (abstract, 1881, p. 190).
1884. Stictopora multipora. Hall, Rep. State Geologist New York for the year 1883, p. 43.

Hamilton: Lodi Landing, Seneca County, Eighteenmile Creek, and many other localities in central and western New York; Thedford, Ontario.

Cystodictya ? incrassata Whiteaves. See Stictopora ? ? incrassata (Hall).

Cystodictya ? invertis (Hall).

1883. Stictopora invertis. Hall, Trans. Albany Institute, X, p. 157 (abstract, 1881, p. 15).
1883. Stictopora invertis. Hall, Rep. State Geologist New York for the year 1882, pl. (28) xxv, 24–26.
1887. Stictopora invertis. Hall and Simpson, Pal. New York, VI, p. 94, pl. xxviii, 24–26.
1890. Cystodictya invertis. Ulrich, Geol. Surv. Illinois, VIII, p. 492.

Upper Helderberg: New York.

Cystodictya limata (Hall and Simpson).

1887. Stictopora limata. Hall and Simpson, Pal. New York, VI, p. 250, pl. lxi, 14–16.
1890. Cystodictya limata. Ulrich, Geol. Surv. Illinois, VIII, p. 492.
1891. Stictopora limata. Hall, Tenth Ann. Rep. State Geologist New York for the year 1890, p. 44; Forty-fourth Ann. Rep. New York State Mus., p. 74.

Hamilton: Darien Center, New York.

Obs. See also Cystodictya subrigida (Hall).

Cystodictya linearis (Hall).

1883. Stictopora linearis. Hall, Trans. Albany Institute, X, p. 157 (abstract, 1881, p. 15).
1883. Stictopora linearis. Hall, Rep. State Geologist New York for the year 1882, pl. (28) xxv, 4, 5.
1887. Stictopora linearis. Hall and Simpson, Pal. New York, VI, p. 96, pl. xxvii, 1, pl. xxviii, 4, 5.

Cystodictya linearis (Hall)—Continued.

1890. Cystodictya linearis. Ulrich, Geol. Surv. Illinois, VIII, p. 492.
1886. Stictopora rectilatera. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxvii, 1.
Upper Helderberg: Onondaga Valley and Le Roy, New York.

Cystodictya lineata Ulrich.

1884. Cystodictya lineata. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, p. 37, pl. ii, 4-4*c*.
Keokuk: Kings Mountain, Kentucky.

Cystodictya lineata-major Ulrich.

1890. Cystodictya lineata var. major. Ulrich, Geol. Surv. Illinois, VIII, p. 495, pl. lxxvi, 3.
St. Louis: Alton, Illinois.

Cystodictya lineata-sancti-ludovici Ulrich.

1890. Cystodictya lineata var. sancti-ludovici, Ulrich, Geol. Surv. Illinois, VIII, p. 492.
St. Louis: St. Louis, Missouri; Eddyville and Elizabethtown, Kentucky.

Cystodictya meeki (Nicholson).

1874. Ptilodictya Meeki. Nicholson, Geol. Mag., new ser., I, p. 123, pl. vi, 14.
1874. Ptilodictya Meeki. Nicholson, Pal. Province Ontario, p. 97, fig. 34.
1898. Cystodictya Meeki. Whiteaves, Contr. Canadian Pal., I, p. 377.
Upper Helderberg: Port Colborne, Ontario.
Hamilton: Arkona, Ontario.
Obs. This may be a synonym for Cystodictya sulcata (Winchell).

Cystodictya nitida Ulrich.

1890. Cystodictya nitida. Ulrich, Geol. Surv. Illinois, VIII, p. 493, pl. lxxvi, 4-4c.
1894. Cystodictya nitida. Keyes, Missouri Geol. Surv., V, p. 17.
Keokuk: Bentonsport, Iowa.

Cystodictya ocellata Ulrich.

1882. Cystodictya occellata. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 170, pl. viii, 3, 3*a*.
1884. Cystodictya ocellata. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, pl. ii, 3, 3*a*.
1889. Cystodictya ocellata. Miller, North American Geol. Pal., figs. 469, 470 (p. 299).
1890. Cystodictya occellata. Ulrich, Geol. Surv. Illinois, VIII, fig. 8*d* (p. 320).
Keokuk: Near Somerset, Kentucky.

Cystodictya ovata (Hall and Simpson).

1887. Stictopora ovata. Hall and Simpson, Pal. New York, VI, p. 248, pl. lxiii, 24.
1890. Cystodictya ovata. Ulrich, Geol. Surv. Illinois, VIII, p. 492.
1891. Stictopora ovata. Hall, Tenth Ann. Rep. State Geologist New York for the year 1890, p. 43; Forty-fourth Ann. Rep. New York State Mus., p. 73.
Hamilton: Canandaigua Lake, New York.

Cystodictya ovatipora (Hall).

1883. Stictopora ovatipora. Hall, Trans. Albany Institute, X, p. 156 (abstract, 1881, p. 14).
1883. Stictopora ovatipora. Hall, Rep. State Geologist New York for the year 1882, pl. (28) xxv, 23, 23*a*.

Cystodictya ovatipora (Hall)—Continued.

1886. Stictopora ovatipora. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxvii, 12–19.
1887. Stictopora ovatipora. Hall and Simpson, Pal. New York, VI, p. 93, pl. xxvii, 12–19 (not pl. xxviii, 23, 23*a*).
1890. Cystodictya ovatipora. Ulrich, Geol. Surv. Illinois, VIII, p. 492.
1897. Cystodictya ovatipora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. x, 18, 19.
Not Stictopora ovatipora. Miller, North American Geol. Pal., fig. 518 (p. 324), = Stictotrypa similis (Hall).
Hamilton: Falls of the Ohio.

Cystodictya perarcta (Hall).

1883. Stictopora perarcta. Hall, Trans. Albany Institute, X, p. 157 (abstract, 1881, p. 15).
1886. Stictopora perarcta. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxix, 36, 37.
1887. Stictopora perarcta. Hall and Simpson, Pal. New York, VI, p. 96, pl. xxix, 36, 37.
1890. Cystodictya perarcta. Ulrich, Geol. Surv. Illinois, VIII, p. 492.
Upper Helderberg: Onondaga Valley, New York.

Cystodictya pustulosa Ulrich.

1890. Cystodictya pustulosa. Ulrich, Geol. Surv. Illinois, VIII, p. 495, pl. lxxvi, 2, 2*a*.
1894. Cystodictya pustulosa. Keyes, Missouri Geol. Surv., V, p. 17.
Keokuk: Kings Mountain, Kentucky; Keokuk, Iowa; Warsaw and Nauvoo, Illinois.

Cystodictya recta (Hall and Simpson).

1887. Stictopora recta. Hall and Simpson, Pal. New York, VI, p. 253.
1891. Stictopora recta. Hall, Tenth Ann. Rep. State Geologist New York for the year 1890, p. 47; Forty-fourth Ann. Rep. New York State Mus., p. 77.
1899. Stictopora recta. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 173.
Hamilton: West Hamburg, New York.

Cystodictya rectilinea (Hall and Simpson).

1887. Stictopora rectalinea. Hall and Simpson, Pal. New York, VI, p. 245, pl. lxiii, 23.
1890. Cystodictya rectalinea. Ulrich, Geol. Surv. Illinois, VIII, p. 492.
1891. Stictopora rectalinea. Hall, Tenth Ann. Rep. State Geologist New York for the year 1890, p. 40; Forty-fourth Ann. Rep. New York State Mus., p. 70.
1898. Cystodictya rectilinea. Whiteaves, Contr. Canadian Pal., I, p. 377.
Hamilton: West Williams, Ontario.

Cystodictya rigida (Hall).

1883. Stictopora rigida. Hall, Trans. Albany Institute, X, p. 156 (abstract, 1881, p. 14).
1883. Stictopora rigida. Hall, Rep. State Geologist New York for the year 1882, pl. (28) xxv, 15, 16.
1887. Stictopora rigida. Hall and Simpson, Pal. New York, VI, p. 91, pl. xxviii, 15, 16.
1890. Cystodictya rigida. Ulrich, Geol. Surv. Illinois, VIII, p. 492.
Upper Helderberg: Near Le Roy, New York.

Cystodictya semistriata (Hall).

1883. Stictopora semistriata. Hall, Trans. Albany Institute, X, p 156 (abstract, 1881, p. 14).
1883. Stictopora semistriata. Hall, Rep. State Geologist New York for the year 1882, pl. (28) xxv, 17–20.
1887. Stictopora semistriata. Hall and Simpson, Pal. New York, VI, p. 95, pl xxviii, 17–20.
1890. Cystodictya semistriata. Ulrich, Geol. Surv. Illinois, VIII, p. 492.
Upper Helderberg: Near Le Roy, New York.

Cystodictya simulans Ulrich.

1888. Cystodictya simulans. Ulrich, Bull. Denison Univ., IV, p. 81, pl. xiii, 10.
Keokuk: Warsaw, Illinois; Keokuk, Iowa.
Waverly: Moots Run, Ohio.

Cystodictya sinuosa (Hall).

1883. Stictopora sinuosa. Hall, Trans. Albany Institute, X, p. 190 (abstract, 1881, p. 190).
1884. Stictopora sinuosa. Hall, Rep. State Geologist New York for the year 1883, p. 42.
1887. Stictopora sinuosa. Hall and Simpson, Pal. New York, VI, p. 247, pl. lxi, 17.
1890. Cystodictya sinuosa. Ulrich, Geol. Surv. Illinois, VIII, p. 492.
1891. Stictopora sinuosa. Hall, Tenth Ann. Rep. State Geologist New York for the year 1890, p. 42; Forty-fourth Ann. Rep. New York State Mus., p. 72.
1897. Stictocella sinuosa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 532.
1899. Stictopora sinuosa. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 173, fig. 68.
Hamilton: South of Auburn and Eighteen-Mile Creek, New York.

Cystodictya subrigida (Hall).

1883. Stictopora subrigida. Hall, Trans. Albany Institute, X, p. 190 (abstract, 1881, p. 190).
1884. Stictopora subrigida. Hall, Rep. State Geologist New York for the year 1883, p. 43.
1887. Stictopora subrigida. Hall and Simpson, Pal. New York, VI, p. 251, pl. lx, 21.
1890. Cystodictya subrigida. Ulrich, Geol. Surv. Illinois, VIII, p. 492.
1891. Stictopora subrigida. Hall, Tenth Ann. Rep. State Geologist New York for the year 1890, p. 45; Forty-fourth Ann. Rep. New York State Mus., p. 75.
1884. Stictopora crenulata. Hall, Rep. State Geologist New York for the year 1883, p. 44.
1887. Stictopora crenulata. Hall and Simpson, Pal. New York, VI, p. 252, pl. lx, 22.
1890. Cystodictya crenulata. Ulrich, Geol. Surv. Illinois, VIII, p. 492.
1891. Stictopora crenulata. Hall, Tenth Ann. Rep. State Geologist New York for the year 1890, p. 45; Forty-fourth Ann. Rep. New York State Mus., p. 75.
Hamilton: Near Middleburg and near Alden Station, New York.
Obs. Cystodictya limata (Hall and Simpson) may be a synonym of this species.

Cystodictya sulcata (Winchell).

1866. Stictopora sulcata. Winchell, Rep. Lower Penin. Michigan, p. 92.
1890. Cystodictya sulcata. Ulrich, Geol. Surv. Illinois, VIII, p. 492.
Hamilton: Petoskey, Michigan.
Obs. Compare Cystodictya meeki (Nicholson) with this species.

Cystodictya trilineata (Hall and Simpson).

1887. Stictopora trilineata. Hall and Simpson, Pal. New York, VI, p. 243, pl. lxi, 26, 27.
1890. Cystodictya trilineata. Ulrich, Geol. Surv. Illinois, VIII, p. 492.
Hamilton: Moscow and near Canandaigua Lake, New York.

Cystodictya tumulosa (Hall and Simpson).

1887. Stictopora tumulosa. Hall and Simpson, Pal. New York, VI, p. 246, pl. lxi, 18–22.
1890. Cystodictya tumulosa. Ulrich, Geol. Surv. Illinois, VIII, p. 492.
1891. Stictopora tumulosa. Hall, Tenth Ann. Rep. State Geologist New York for the year 1890, p. 41; Forty-fourth Ann. Rep. New York State Mus., p. 71.
Hamilton: Moscow, and south of Le Roy, New York.

Cystodictya vermicula (Hall).

1886. Stictopora vermicula. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxvii, 2–4.
1887. Stictopora vermicula. Hall and Simpson, Pal. New York, VI, p. 93, pl. xxvii, 2–4.
1890. Cystodictya vermicula. Ulrich, Geol. Surv. Illinois, VIII, p. 492.
Hamilton: Falls of the Ohio.

Cystodictya zigzag Ulrich.

1888. Cystodictya zigzag. Ulrich, Bull. Denison Univ., IV., p. 81, pl. xiii, 11, 11*a*.
Keokuk: Keokuk, Iowa.
Waverly (Cuyahoga shale): Richfield, Ohio.

CYSTOPORA Hall. Genotype: Cystopora geniculata Hall.

1883. Cystopora. Hall, Trans. Albany Institute, X, p. 161 (abstract, 1881, p. 19).
1887. Cystopora. Hall and Simpson, Pal. New York, VI, p. xxv.
1889. Cystopora. Miller, North American Geol. Pal., p. 300.
1897. Cystopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 598.

Cystopora geniculata Hall.

1883. Cystopora geniculata. Hall, Trans. Albany Institute, X, p. 161 (abstract, 1881, p. 20).
1887. Cystopora geniculata. Hall and Simpson, Pal. New York, VI, p. 103, pl. lxvi, 7–10.
1897. Cystopora geniculata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxv, 3–5.
Hamilton: Falls of the Ohio.

DEKAYELLA Ulrich. Genotype: Dekayella obscura Ulrich.

1882. Dekayella. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 155; ibid., VI, 1883, p. 90.
1889. Dekayella. Miller, North American Geol. Pal., p. 184.
1890. Dekayella. Ulrich, Geol. Surv. Illinois, VIII, p. 372.
1893. Dekayella. Ulrich, Geol. Minnesota, III, p. 269.
1896. Dekayella. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 273.

DEKAYELLA Ulrich—Continued.

1897. Dekayella. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 589.

Dekayella obscura Ulrich.

1883. Dekayella obscura. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 89, pl. i, 4–4*b*.

1896. Dekayella obscura. Ulrich, Zittel's Textb. Pal. (Engl. ed.), fig. 454 (p. 274).

1897. Dekayella obscura. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 180–182 (p. 589).

Cincinnati (Utica): Cincinnati, Ohio, and vicinity.

Dekayella prænuntia Ulrich.

1893. Dekayella prænuntia. Ulrich, Geol. Minnesota, III, p. 270, pl. xxiii, 32–47.

1897. Dekayella prænuntia. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 177–179 (p. 589).

Trenton (Black River): Minneapolis, St. Paul, and Goodhue and Fillmore counties, Minnesota.

Dekayella prænuntia-echinata Ulrich.

1893. Dekayella prænuntia var. echinata. Ulrich, Geol. Minnesota, III, p. 271, pl. xxiii, 32–38.

Trenton (Black River): Fountain, Minneapolis and St. Paul, Minnesota.

Dekayella prænuntia-multipora Ulrich.

1893. Dekayella prænuntia var. multipora. Ulrich, Geol. Minnesota, III, p. 272, pl. xxiii, 44–47.

Trenton (Black River): Minneapolis, St. Paul, and Goodhue and Fillmore counties, Minnesota.

Dekayella prænuntia-nævigera Ulrich.

1893. Dekayella prænuntia var. nævigera. Ulrich, Geol. Minnesota, III, p. 271.

Trenton (Black River): Fillmore County, Minnesota.

Dekayella prænuntia-simplex Ulrich.

1893. Dekayella prænuntia var. simplex. Ulrich, Geol. Minnesota, III, p. 271, pl. xxiii, 39–42.

Trenton (Stones River and Black River): Minneapolis and St. Paul, Minnesota.

Dekayella trentonensis (Ulrich).

1883. Dekayia trentonensis. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 151, pl. vi, 6, 6*a*.

1893. Dekayia trentonensis. Ulrich, Geol. Minnesota, III, p. 274.

Trenton: Burgin and Frankfort, Kentucky; St. Paul and Cannon Falls, Minnesota.

Dekayella ulrichi (Nicholson).

1874. Chætetes Fletcheri (not of Milne-Edwards and Haime). Nicholson, Quar. Jour. Geol. Soc. London, XXX, p. 504, pl. xxix, 6, 6*a*.

1875. Chætetes Fletcheri (not of Milne-Edwards and Haime). Nicholson, Pal. Ohio, II, p. 197, pl. xxi, 7, 7a.

1876. Chætetes Fletcheri (not of Milne-Edwards and Haime). Nicholson, Ann. Mag. Nat. Hist., ser. 4, XVIII, p. 90, pl. v, 14.

1881. Chætetes Fletscheri (not of Milne-Edwards and Haime). Quenstedt, Roehren- und Sternkorallen. p. 83, pl. cxlvi, 27.

Dekayella ulrichi (Nicholson)—Continued.

1881. Monticulipora (Heterotrypa) Ulrichii. Nicholson, Genus Monticulipora, p. 131, fig. 22.
1883. Monticulipora ulrichii. (Van Cleve) Hall, Twelfth Ann. Rep. Indiana Geol. Nat. Hist., p. 249, pl. xi, 10.
1883. Dekayella ulrichi. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, pp. 91, 153.
1888. Monticulipora ulrichii. James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 179.
1894. Monticulipora ulrichii. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 201.
Cincinnati (Utica): Cincinnati, Ohio, and vicinity.

Dekayella ulrichi-robusta Foord.

1884. Dekayella robusta. Foord, Ann. Mag. Nat. Hist., ser. 5, XIII, p. 341, pl. xii, 2-2*d*.
1884. Monticulipora ohioensis. James, Jour. Cincinnati Soc. Nat. Hist., VII, p. 137, pl. vii, 1, 1*a*.
1888. Monticulipora ohioensis. James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 183.
1894. Monticulipora ohioensis. J. F. James, Jour. Cincinnati Soc. Nat Hist., XVI, p. 207.
Cincinnati (Utica): Cincinnati, Ohio, and vicinity.

DEKAYIA Milne-Edwards and Haime. Genotype: Dekayia aspera Milne-Edwards and Haime.

1851. Dekayia. Milne-Edwards and Haime, Pol. Foss. Terr. Pal., p. 277.
1860. Dekayia. Milne-Edwards, Hist. Nat. des Corall., III, p. 283.
1879. Dekayia. Nicholson, Pal. Tabulate Corals, p. 291.
1881. Dekayia. Nicholson, Genus Monticulipora, p. 98.
1882. Dekayia. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 155; ibid., VI, 1883, p. 148.
1886. Dekayia. Waagen and Wentzel, Pal. Indica, Ser. XIII, p. 874.
1888. Dekayia. James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 28.
1889. Dekayia. Miller, North American Geol. Pal., p. 184.
1890. Dekayia. Ulrich, Geol. Surv. Illinois, VIII, pp. 371, 415.
1893. Dekayia. Ulrich, Geol. Minnesota, III, p. 274.
1896. Dekayia. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 273.
1896. Dekayia. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 115.
1897. Dekayia. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 578.

Dekayia appressa Ulrich.

1883. Dekayia appressa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, p. 152, pl. vi, 7-7*b*.
Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.

Dekayia aspera Milne-Edwards and Haime.

1851. Dekayia aspera. Milne-Edwards and Haime, Pol. Foss. Terr. Pal., p. 278, pl. xvi, 2, 2*a*.
1860. Dekayia aspera. Milne-Edwards, Hist. Nat. des Corall., III, p. 283.
1883. Dekayia aspera. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 148, pl. vi, 5.
1888. Monticulipora (Dekayia) aspera. James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 28.
1896. Monticulipora (Dekayia) aspera. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 116.

Dekayia aspera Milne-Edwards and Haime—Continued.

1896. Dekayia aspera. Ulrich, Zittel's Textb. Pal. (Eng. ed.), fig. 455 (p. 274).
1874. Chætetes attritus. Nicholson, Quar. Jour. Geol. Soc. London, XXX, p. 503, pl. xxix, 4, 4*a*.
1875. Chætetes attritus. Nicholson, Pal. Ohio, II, p. 194, pl. xxi, 4.
1876. Dekayia attrita. Nicholson, Ann. Mag. Nat. Hist., ser. 4, XVIII, p. 93, pl. v, 12, 12*a*.
1879. Dekayia attrita. Nicholson, Pal. Tabulate Corals, p. 298, pl. xv, 1-1*c*.
Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.

Dekayia attrita Nicholson. See Dekayia aspera Milne-Edwards and Haime.

Dekayia? devonica Ulrich.

1890. Dekayia devonica. Ulrich, Geol. Surv. Illinois, VIII, p. 416, pl. xlv, 5-5*d*.
1897. Dekayia devonica. Simpson, Fourteenth Ann. Rep. State Geologist New York, for the year 1894, figs. 141-144 (p. 578).
Hamilton: Falls of the Ohio; Eighteen-Mile Creek, New York.

Dekayia maculata James.

1881. Dekayia maculata. James, Paleontologist, No. 5, p. 37.
1896. Monticulipora (Dekayia) maculata. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 116, fig. 11.
Cincinnati (Utica): Loveland and Cincinnati, Ohio, and vicinity.

Dekayia multispinosa Ulrich.

1883. Dekayia multispinosa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 154, pl. vi, 8, 8*a*.
Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.

Dekayia paupera Ulrich. See Heterotrypa paupera (Ulrich).

Dekayia pelliculata Ulrich.

1883. Dekayia pelliculata. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 150, pl. vi, 9, 9*a*.
1896. Monticulipora (Dekayia) pelliculata. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 117.
Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.

Dekayia trentonensis Ulrich. See Dekayella trentonensis (Ulrich).

Dendricopora De Koninck. See Ptilopora McCoy.

DIAMESOPORA Hall. Genotype: Diamesopora dichotoma Hall.

1852. Diamesopora. Hall, Pal. New York, II, p. 158. (Not defined.)
1887. Diamesopora. Hall and Simpson, Pal. New York, VI, pp. xv, 19.
1889. Diamesopora. Miller, North American Geol. Pal., p. 300.
1897. Diamesopora. Simpson, Fourteenth Ann. Rep. State Geologist New York, for the year 1894, p. 566.
Not Diamesopora (= Cœloclema). Ulrich, Geol. Surv. Illinois, VIII, 1890, pp. 380, 467; Geol. Minnesota, III, 1893, p. 330; Zittel's Textb. Pal. (Engl. ed.), 1896, p. 268.

Diamesopora camerata Hall and Simpson. See Chilotrypa camerata (Hall).

Diamesopora communis Ulrich. See Cœloclema concentricum (James).

Diamesopora constricta Hall and Simpson. See Chilotrypa constricta (Hall).

Diamesopora dichotoma Hall.
1852. Diamesopora dichotoma. Hall, Pal. New York, II, p. 158, pl. xl B, 3*a*–*d*.
Niagara: Lockport, New York.

Diamesopora dispersa Hall. See Chilotrypa dispersa (Hall).

Diamesopora infrequens (Hall).
1876. Trematopora infrequens. Hall, Twenty-eighth Ann. Rep. New York State Mus. (documentary edition), pl. x, 13, 14 (in error for 3, 4); ibid., (Museum edition, 1879), p. 111, pl. x, 3 (in part), 4.
1882. Trematopora infrequens. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 232, pl. ix, 3 (in part), 4.
1883. Cœloclema infrequens. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 258.
1890. Diamesopora infrequens. Ulrich, Geol. Surv. Illinois, VIII, p. 467.
Niagara: Waldron, Indiana.

Diamesopora osculum (Hall).
1876. Trematopora osculum. Hall, Twenty-eighth Ann. Rep. New York State Mus. (documentary edition), pl. x, 3–12 (3 and 4 in error); ibid., (Museum edition, 1879), p. 110, pl. x, 5–8, 11–14.
1882. Trematopora osculum. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 231, pl. ix, 5–8, 11–14.
1883. Cœloclema osculum. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 258.
1890. Diamesopora osculum. Ulrich, Geol. Surv. Illinois, VIII, p. 467.
Niagara: Waldron, Indiana.

Diamesopora oweni Ulrich. See Cœloclema oweni (James).

Diamesopora subimbricata (Hall).
1879. Trematopora subimbricata. Hall, Twenty-eighth Ann. Rep. New York State Mus. (Museum edition), pl. x, 9, 10.
1883. Trematopora subimbricata. Hall, Trans. Albany Institute, X, p. 60 (abstract, 1879, p. 4).
1882. Trematopora subimbricata. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 234, pl. ix, 9, 10.
1882. Cœloclema imbricata. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p, 258.
1890. Diamesopora subimbricata. Ulrich, Geol. Surv. Illinois, VIII, p. 467.
Niagara: Waldron, Indiana.

Diamesopora trentonensis Ulrich. See Cœloclema trentonensis (Ulrich).

Diamesopora ? tubulosa (Hall).
1852. Trematopora tubulosa. Hall, Pal. New York, II, p. 151, pl. xl A, 3*a*–*c*
1866. Diamesopora tubulosa. Rominger, Proc. Acad. Nat. Sci. Philadelphia, p. 119.
1890. Diamesopora tubulosa. Ulrich, Geol. Surv. Illinois, VIII, p. 467.
Clinton: Wayne County, New York.

Diamesopora varia Ulrich. See Chilotrypa varia (Hall).

Diamesopora vaupeli Ulrich. See Cœloclema alternatum (James).

DIANULITES Eichwald.
1829. Dianulites. Eichwald, Zool. Spec., I, p. 180.
1860. Dianulites. Eichwald, Lethæa Rossica, I, p. 487.
1877. Dianulites. Dybowski, Die Chætetiden der Ostbaltischen Silur-form., p. 14.
1881. Dianulites. Nicholson, Genus Monticulipora, pp. 20, 155.
1886. Dianulites. Waagen and Wentzel, Pal. Indica, Ser. XIII, p. 874.
1897. Dianulites. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 587.

DIANULITES Eichwald—Continued.

Obs. This genus as defined by Eichwald is wholly unintelligible and was, until 1877 when Dybowski resurrected and redefined it, not recognized by paleontologists. Dybowski has not helped the matter by his effort, for his arrangement of the species is quite arbitrary, no two forms perhaps being strictly congeneric.

Diastoporella Vine. See Berenicea Lamouroux.

DIASTOPORINA Ulrich. Genotype: **Diastoporina flabellata** Ulrich.

1890. Diastoporina. Ulrich, Jour. Cincinnati Soc. Nat. Hist., XII, p. 177.
1892. Diastoporina. Miller, North American Geol. Pal., First Appendix, p. 684.
1893. Diastoporina. Ulrich, Geol. Minnesota, III, p. 121.
1897. Diastoporina. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 595.

Diastoporina flabellata Ulrich.

1890. Diastoporina flabellata. Ulrich, Jour. Cincinnati Soc. Nat. Hist., XII, p. 178, fig. 5.
1893. Diastoporina flabellata. Ulrich, Geol. Minnesota, III, p. 122, pl. ii, 2, 3.
1897. Diastoporina flabellata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 199, 200 (p. 595).
Trenton: Cannon Falls and St. Paul, Minnesota.

DICHOTRYPA Ulrich. Genotype: **Dichotrypa foliata** Ulrich.

1890. Dichotrypa. Ulrich, Geol. Surv. Illinois, VIII, pp. 386, 498.
1889. Dichotrypa. (Ulrich, in press) Miller, North American Geol. Pal., p.300.

Dichotrypa elegans Ulrich.

1890. Dichotrypa elegans. Ulrich, Geol. Surv. Illinois, VIII, p. 500, pl. lxxvi, 8–8*d*.
St. Louis: Elizabethtown, Kentucky; Jersey and Monroe counties, Illinois.
Obs. See Dichotrypa grandis Ulrich for a probable synonym.

Dichotrypa expatiata Ulrich.

1890. Dichotrypa expatiata. Ulrich, Geol. Surv. Illinois, VIII, p. 501.
St. Louis: Alton, Illinois.

Dichotrypa flabellum (Rominger).

1866. Fistulipora flabellum. Rominger, Proc. Acad. Nat. Sci. Philadelphia, p. 122.
1890. Dichotrypa flabellum. Ulrich, Geol. Surv. Illinois, VIII, p. 501, pl. lxxvii, 1–1*b*.
Warsaw: Spergen Hill, Indiana.
St. Louis: Elizabethtown and Eddyville, Kentucky; Clarksville, Tennessee.

Dichotrypa foliata Ulrich.

1890. Dichotrypa foliata. Ulrich, Geol. Surv. Illinois, VIII, p. 499, pl. xlii, 2–2*g*.
Hamilton: Buffalo, Iowa.

Dichotrypa grandis Ulrich.

1890. Dichotrypa grandis. Ulrich, Geol. Surv. Illinois, VIII, p. 498, pl. xlii, 1–1*e*.
Niagara (?): Will County, near Wilmington, Illinois (?).
Obs. This form is probably from the St. Louis group of Illinois and may be the same as Dichotrypa elegans Ulrich.

Dichotrypa intermedia Ulrich.

1890. Dichotrypa intermedia. Ulrich, Geol. Surv. Illinois, VIII, p. 500, pl. lxxvi, 9–9c.

Dichotrypa intermedia Ulrich—Continued.

1894. Dichotrypa intermedia. Keyes, Missouri Geol. Surv., V, p. 18.
St. Louis: Alton and Columbia, Illinois; St. Louis, Missouri.

Dichotrypa lyroides Ulrich.

1890. Dichotrypa lyroides. Ulrich, Geol. Surv. Illinois, VIII, p. 502, pl. lxxvii, 2–2*b*.
St. Louis: Southern Kentucky.

DICRANOPORA Ulrich. Genotype: Ptilodictya internodia Miller and Dyer.

1882. Dicranopora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, pp. 152, 166.
1889. Dicranopora. Miller, North American Geol. Pal., p. 300.
1890. Dicranopora. Ulrich, Geol. Surv. Illinois, VIII, p. 389.
1897. Dicranopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 545.

Dicranopora emacerata (Nicholson).

1875. Ptilodictya emacerata. Nicholson, Ann. Mag. Nat. Hist., ser. 4, XV, p. 179, pl. xiv, 3–3*b*.
1875. Ptilodictya emacerata. Nicholson, Pal. Ohio, II, p. 261, pl. xxv, 5–5*b*.
1889. Dicranopora emacerata. Ulrich, Contr. Micro-Pal. Cambro-Sil., Part II, p. 40.
1895. Dicranopora emacerata. Whiteaves, Pal. Foss., III, p. 118.
Cincinnati (Lorraine and Richmond): Cincinnati, Ohio, and vicinity; Stony Mountain, Manitoba.

Dicranopora fragilis (Billings).

1866. Ptilodictya fragilis. Billings, Catal. Sil. Foss. Anticosti, p. 9.
1882. Stictopora fragilis. Whitfield, Geol. Surv. Wisconsin, IV, p. 253, pl. xi, 24.
1889. Dicranopora fragilis. Ulrich, Contr. Micro-Pal. Cambro-Sil., Part II, p. 40.
1895. Dicranopora fragilis. Whiteaves, Pal. Foss., III, p. 118.
Anticosti: Anticosti Island.
Cincinnati (Richmond): Iron Ridge, Wisconsin; Stony Mountain, Manitoba.

Dicranopora granulosa (Hall and Simpson).

1883. Escharopora (Ptilodictya) lirata (in part). Hall, Rep. State Geologist New York for the year 1882, pl. xvii, 5, 6.
1887. Rhinidictya ? granulosa. Hall and Simpson, Pal. New York, VI, p. 40, pl. xvii, 5, 6, pl. xxiii A, 18, 19.
1897. Rhinidictya granulosa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. x, 3–5.
Lower Helderberg: Clarksville, New York.

Dicranopora internodia (Miller and Dyer).

1878. Ptilodictya internodia. Miller and Dyer, Contr. to Pal., No. 2, p. 7, pl. iv, 7, 7*a*.
1882. Dicranopora internodia. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 166, pl. vii, 9, 9*a*.
1889. Dicranopora internodia. Miller, North American Geol. Pal., fig. 471 (p. 300).
Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.
Obs. See also Helopora ? ? meeki James.

Dicranopora lata Ulrich. See Rhinidictya lata (Ulrich).

Dicranopora nitidula (Billings).

1866. Ptilodictya nitidula. Billings, Catal. Sil. Foss. Anticosti, p. 9.
1889. Dicranopora nitidula. Miller, North American Geol. Pal., p. 300.
Cincinnati (Richmond): Anticosti Island.

Dicranopora parva Ami. Not recognizable.

1892. Dicranopora parva. Ami, Canadian Record of Science, V, p. 99.
Trenton: Gagnon's Beach, Quebec.

Dicranopora trentonensis Ulrich. See Rhinidictya trentonensis (Ulrich).

Didymopora Ulrich. See Fistulipora McCoy.

DIPLOCLEMA Ulrich. Genotype: Diploclema trentonense Ulrich.

1890. Diploclema. Ulrich, Geol. Surv. Illinois, VIII, p. 368.
1889. Diploclema. (Ulrich, in press), Miller, North American Geol. Pal., p. 300.
1896. Diploclema. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 262.

Diploclema sparsum (Hall).

1852. Trematopora sparsa. Hall, Pal. New York, II, p. 155, pl. xl A, 12*a*–*d*.
1890. Diploclema sparsum. Ulrich, Geol. Surv. Illinois, VIII, p. 369, pl. liii, 10.
Niagara: Lockport, New York.

Diploclema trentonense Ulrich.

1890. Diploclema trentonense. Ulrich, Geol. Surv. Illinois, VIII, p. 369, pl. liii, 9–9*c*.
Trenton: Trenton Falls, New York.

Diplopora Young and Young. See Diploporaria.

DIPLOPORARIA.[1] Genotype: Glauconome (Diplopora) marginalis Young and Young.

1875. Diplopora. Young and Young, Proc. Nat. Hist. Soc. Glasgow, II, p. 326.
1889. Diplopora. Miller, North American Geol. Pal., p. 300.
1890. Diplopora. Ulrich, Geol. Surv. Illinois, VIII, pp. 398, 636.
1895. Diplopora. Whidborne, Devon. Fauna England, (Pal. Soc. Publ.), II, pt. 4, p. 182.
1896. Diplopora. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 283.
1897. Diplopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 525.
1886. Nov. gen. Ulrich, Contr. American Pal., I, p. 5.

Diploporaria bifurcata (Ulrich).

1890. Diplopora bifurcata. Ulrich, Geol. Surv. Illinois, VIII, p. 637, pl. lxii, 12, 12*a*.
1894. Diplopora bifurcata. Keyes, Missouri Geol. Surv., V, p. 33.
1897. Diplopora bifurcata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 76, 77 (p. 526).
Chester: Chester, Illinois.

Diploporaria biserialis (Ulrich).

1890. Diplopora biserialis. Ulrich, Geol. Surv. Illinois, VIII, p. 637, pl. lxii, 11–11*c*.
Lower Coal Measures: Seville, Illinois.

DIPLOTRYPA Nicholson. Genotype: Favosites petropolitanus Pander.

1879. Diplotrypa. Nicholson, Pal. Tabulate Corals, p. 292.
1881. Diplotrypa. Nicholson, Genus Monticulipora, pp. 101, 155.

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[1] Proposed for Diplopora, preoccupied by Schafhäutl (see Neues Jahrbuch for Mineralogie, 1866, p. 565). We have been unable to refer to Schafhäutl's work, Lethæa geognostica von Südbayern, Leipzig, 1863.

DIPLOTRYPA Nicholson—Continued.

1882. Diplotrypa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V., p. 153.
1883. Diplotrypa. Foord, Contr. Micro-Pal. Cambro-Sil., p. 13.
1889. Diplotrypa. Miller, North American Geol. Pal., p. 187.
1890. Diplotrypa. Ulrich, Geol. Surv. Illinois, VIII, pp. 378, 457.
1893. Diplotrypa. Ulrich, Geol. Minnesota, III, p. 285.
1896. Diplotrypa. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 275; also (not Ulrich) p. 104 (in part).
1877. Callopora (not Hall). Dybowski, Die Chætetiden d. Ostb. Silur-Form., p. 106.

Diplotrypa ? dubia Ulrich.

1890. Diplotrypa ? dubia. Ulrich, Geol. Surv. Illinois, VIII, p. 459, pl. xxxiii 3-3*b*.
1894. Monticulipora dubia. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 182.
Cincinnati (Richmond): Wilmington, Illinois.

Diplotrypa infida Ulrich. See Mesotrypa infida (Ulrich).

Diplotrypa limitaris Ulrich.

1893. Diplotrypa limitaris. Ulrich, Geol. Minnesota, III, p. 286, fig. 18.
Trenton: Goodhue County, Minnesota.

Diplotrypa milleri Ulrich. See Mesotrypa milleri (Ulrich).

Diplotrypa neglecta Ulrich.

1893. Diplotrypa neglecta. Ulrich, Geol. Minnesota, III, p. 287, fig. 19.
Trenton: Hader, Minnesota.

Diplotrypa patella Ulrich. See Mesotrypa patella (Ulrich).

Diplotrypa Quebecensis Ami. See Mesotrypa quebecensis (Ami).

Diplotrypa regularis Foord. See Mesotrypa regularis (Foord).

Diplotrypa westoni Ulrich.

1889. Diplotrypa Westoni. Ulrich, Contr. Micro-Pal. Cambro-Sil., Part II, p. 30, pl. viii, 4-4*b*.
1896. Diplotrypa Westoni. Ulrich, Zittel's Textb. Pal. (Engl. ed.), fig. 457 (p. 274).
1897. Diplotrypa Westoni. Whiteaves, Pal. Foss., III, part III, p. 163.
Trenton: Big Island, Lake Winnipeg, Manitoba.

DISCOTRYPA Ulrich. Genotype: Chætetes elegans Ulrich.

1882. Discotrypa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 155.
1889. Discotrypa. Miller, North American Geol. Pal., p. 300.
1890. Discotrypa. Ulrich, Geol. Surv. Illinois, VIII, p. 378.

Discotrypa ? devonica Ulrich.

1886. Discotrypa devonica. Ulrich, Contr. American Pal., I, p. 25, pl. ii, 8, 8*a*.
Hamilton: Falls of the Ohio.

Discotrypa elegans (Ulrich).

1879. Chætetes elegans. Ulrich, Jour. Cincinnati Soc. Nat. Hist., II, p. 130, pl. xii, 12, 12*a*.
1883. Discotrypa elegans. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 163, pl. vii, 1-1*b*.
1888. Monticulipora elegans. James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 165.

Discotrypa elegans (Ulrich)—Continued.

1894. Monticulipora elegans. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 180.

Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.

DITTOPORA Dybowski. Genotype: Dittopora clavæformis Dybowski.

1877. Dittopora. Dybowski, Die Chætetiden der Ostbaltischen Silur-form., p. 84.

1881. Dittopora. Nicholson, Genus Monticulipora, p. 234.

Obs. This genus was established for a group of monticuliporoids occurring in the Silurian of Russia. The name has not become current in American literature.

DRYMOTRYPA Ulrich. Genotype: Retepora diffusa Hall.

1890. Drymotrypa. Ulrich, Geol. Surv, Illinois, VIII, p. 399.

1892. Drymotrypa. Miller, North American Geol. Pal., First Appendix, p. 684.

1897. Thamnocella. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 525.

Drymotrypa cisseis (Hall).

1879. Thamniscus ? Cisseis. Hall, Thirty-second Ann. Rep. New York State Museum, p. 176 (reprint 1880, p. 38).

1883. Thamniscus ? Cisseis. Hall, Rep. State Geologist New York for the year 1882, pl. xxii, 23–30.

1887. Thamniscus ? Cisseis. Hall and Simpson, Pal. New York, VI, p. 42, pl. xxii, 23–30.

1890. Drymotrypa cisseis. Ulrich, Geol. Surv. Illinois, VIII, p. 399.

1897. Thamnocella Cisseis. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. ix, 9–13.

Lower Helderberg: Clarksville, New York.

Drymotrypa dichotoma (Ulrich).

1890. Drymotrypa dichotoma. Ulrich, Geol. Surv. Illinois, VIII, p. 399, pl. liii, 6.

Trenton: Montreal, Canada.

Drymotrypa diffusa (Hall).

1852. Retepora diffusa. Hall, Pal. New York, II, p. 160, pl. xl C, 1*a–f*.

1890. Drymotrypa diffusa. Ulrich, Geol. Surv. Illinois, VIII, pl. liii, 7–7*b*.

Niagara: Lockport, New York.

Drymotrypa niagarensis (Hall).

1876. Thamniscus ? Niagarensis. Hall, Twenty-eighth Ann. Rep. New York State Mus. (documentary edition), pl. xi, 22–25; ibid., (Museum edition, 1879), p. 126, pl. xi, 22–25.

1882. Thamniscus niagarensis. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 254, pl. x, 22–25.

1890. Drymotrypa niagarensis. Ulrich, Geol. Surv. Illinois, VIII, p. 399.

1897. Thamniscus Niagarensis. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. ix, 15–17.

Niagara: Waldron, Indiana.

Dybowskia Waagen and Pichl. See Fistulipora McCoy.

Dybowskiella Waagen and Wentzel. See Fistulipora McCoy.

Enallopora D'Orbigny. Genotype: Gorgonia perantiqua Hall.

1850. Enallopora. D'Orbigny, Prod. de Pal., I, p. 22.

1889. Enallopora. Miller, North American Geol. Pal., p. 300.

Obs. For objections to the use of this name, see Geol. Surv. Illinois, VIII, p. 683.

Enallopora cinctosa Miller. See Mitoclema cinctosum Ulrich.

Enallopora perantiqua D'Orbigny. See Gorgonia ? perantiqua Hall.

ERIDOPORA Ulrich. Genotype: Eridopora macrostoma Ulrich.

1882. Eridopora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, pp. 137, 157.
1889. Eridopora. Miller, North American Geol. Pal., p. 301.
1890. Eridopora. Ulrich, Geol. Surv. Illinois, VIII, p. 382.
1896. Eridopora. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 269.
1897. Eridopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 561.
1886. Pileotrypa. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, expl. pl. xxx. (Not defined.)
1887. Pileotrypa. Hall and Simpson, Pal. New York, VI, p. xvi.
1889. Pileotrypa. Miller, North American Geol. Pal., p. 315.
1897. Pileotrypa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 562.

Eridopora ? clivulata (Hall).

1883. Lichenalia clivulata. Hall, Trans. Albany Institute, X, p. 151 (abstract, 1881, p. 9).
1886. Lichenalia (Pileotrypa) clivulata. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxxi, 30–33.
1887. Lichenalia (Pileotrypa) clivulata. Hall and Simpson, Pal. New York, VI, p. 83, pl. xxxi, 30–33.
1897. Pileotrypa clivulata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxiii, 8.
Hamilton: Falls of the Ohio.

Eridopora denticulata (Hall).

1883. Lichenalia denticulata. Hall, Trans. Albany Institute, X, p. 149 (abstract, 1881, p. 8).
1883. Lichenalia denticulata. Hall, Rep. State Geologist New York for the year 1882, pl. (26) xxiv, 21, 22, 27.
1886. Lichenalia (Pileotrypa) denticulata. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxx, 12–20.
1887. Lichenalia (Pileotrypa) denticulata. Hall and Simpson, Pal. New York, VI, p. 84, pl. xxvi, 21, 22, 27, pl. xxx, 12–20.
1897. Pileotrypa denticulata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxiii, 12.
1886. Eridopora minima. Ulrich, Contr. American Pal., I, p. 21, pl. ii, 6, *6a*.
Hamilton: Falls of the Ohio.

Eridopora macrostoma Ulrich.

1882. Eridopora macrostoma. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 137, pl. vi, 2, *2a*.
1884. Eridopora macrostoma. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, pl. iii, 8.
1897. Eridopora macrostoma. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 128 (p. 561).
Chester: Sloans Valley, Smithland, and Grayson Springs, Kentucky.

Eridopora minima Ulrich. See Eridopora denticulata (Hall).

Eridopora punctifera Ulrich.

1882. Eridopora punctifera. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 138, pl. vi, 3.
Chester: Sloans Valley, Kentucky.

ERIDOTRYPA Ulrich. Genotype: Eridotrypa mutabilis Ulrich.
1890. Batostomella (in part). Ulrich, Geol. Surv. Illinois, VIII, pp. 375, 432.
1893. Eridotrypa. Ulrich, Geol. Minnesota, III, p. 264.

Eridotrypa appressa (Ulrich).
1890. Monotrypella appressa. Ulrich, Geol. Surv. Illinois, VIII, p. 453, pl. xlvi, 1–1*e* (on plate called Monotrypella simplex in error).
Hamilton: Rock Island, Illinois; Davenport, Iowa.

Eridotrypa briareus (Nicholson).
1875. Chætetes briareus. Nicholson, Pal. Ohio, II, p. 202, pl. xxi, 13–13*b*.
1881. Monticulipora (Monotrypa) briareus. Nicholson, Genus Monticulipora, p. 198, pl. ii, 5–5*c*.
1882. Monotrypella briarea. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, pp. 248, 256.
1888. Monticulipora briarea. James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 172.
1894. Monticulipora briarea. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 191.
Trenton: Covington, Kentucky; Maury County, Tennessee.

Eridotrypa corticosa (Hall).
1874. Trematopora corticosa. Hall, Twenty-sixth Ann. Rep. New York State Mus., p. 105.
1879. Chætetes corticosus. Hall, Thirty-second Ann. Rep. New York State Mus., p. 149 (reprint, 1880, p. 11).
1883. Trematopora (Chætetes) corticosa. Hall, Rep. State Geologist New York for the year 1882, pl. x, 1–10, pl. xiii, 4.
1887. Trematopora ? (Trematella ?) corticosa. Hall and Simpson, Pal. New York, VI, p. 15, pl. x, 1–10, pl. xiii, 4, pl. xxiii, 20.
1893. Eridotrypa corticosa. Ulrich, Geol. Minnesota, III, p. 265.
Lower Helderberg: Clarksville, New York.

Eridotrypa echinata (Hall).
1876. Trematopora echinata. Hall, Twenty-eighth Ann. Rep. New York State Mus. (documentary edition), pl. xi, 1–5; ibid. (Museum edition, 1879), p. 112, pl. xi, 1–5.
1882. Trematopora echinata. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 233, pl. x, 1–5.
1893. Eridotrypa echinata. Ulrich, Geol. Minnesota, III, p. 265.
Niagara: Waldron, Indiana.

Eridotrypa exigua Ulrich.
1893. Eridotrypa exigua. Ulrich, Geol. Minnesota, III, p. 266, pl. xxvi, 17–19.
Trenton: Cannon Falls, Minnesota.

Eridotrypa mutabilis Ulrich.
1893. Eridotrypa mutabilis. Ulrich, Geol. Minnesota, III, p. 265, pl. xxvi, 20–32.
Trenton: Goodhue, Ramsey, and Dakota counties, Minnesota; Decorah, Iowa; Neenah and Oshkosh, Wisconsin; central and northern Kentucky; Nashville and other localities in Tennessee; Ottawa, Canada.

Eridotrypa mutabilis-minor Ulrich.
1893. Eridotrypa mutabilis var. minor. Ulrich, Geol. Minnesota, III, p. 266, pl. xxvi, 20, 21, 29, 30.
Trenton: Cannon Falls and St. Paul, Minnesota.

Eridotrypa ? obliqua (Ulrich).

1890. Batostomella obliqua. Ulrich, Geol. Surv. Illinois, VIII, p. 433, pl. xlvi, 2-2*c*.
1893. Eridotrypa obliqua. Ulrich, Geol. Minnesota, III, p. 265.
Hamilton: Alpena, Michigan.

Eridotrypa simulatrix (Ulrich).

1890. Batostomella simulatrix. Ulrich, Geol. Surv. Illinois, VIII, p. 432, pl. xxxv, 1-1*g*.
1893. Eridotrypa simulatrix. Ulrich, Geol. Minnesota, III, p. 265.
1894. Monticulipora simulatrix. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 194.
Cincinnati (Richmond): Clarksville, Waynesville, and other localities in Ohio; Weisberg and Versailles, Indiana; Savannah, Illinois.

Eridotrypa trentonensis (Nicholson).

1863. Stenopora fibrosa (not of Goldfuss). Billings, Geol. Canada, p. 156, fig. 116 [Foord].
1881. Monticulipora (Heterotrypa) Trentonensis. Nicholson, Genus Monticulipora, p. 149, fig. 28.
1883. Monotrypella Trentonensis. Foord, Contr. Micro-Pal. Cambro-Sil., p. 15.
1883. Monotrypella trentonensis. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 83.
Trenton: Peterboro, Ontario.

Eschara Lamarck. Not Paleozoic.

Eschara bifurcata Van Cleve (Mss.). See Pachydictya bifurcata (Hall).

Eschara ? concentrica Prout. See Cystodictya ? concentrica (Prout).

Eschara ovatopora Troost. Not recognizable.

1840. Escharia ovatopora. Troost, Fifth Geol. Rep. Tennessee, p. 75.
Lower Silurian: Tennessee.

Eschara ramosa Van Cleve (Mss.). See Phænopora fimbriata (James).

Eschara reticulata Troost. Not recognizable.

1840. Escharia reticulata. Troost, Fifth Geol. Rep. Tennessee, p. 75.
Lower Silurian: Tennessee.

Eschara ? tuberculata Prout. Not recognizable.

1858. Eschara ? tuberculata. Prout, Trans. St. Louis Acad. Sci., I, p. 234.
Carboniferous: Organ Mountains, New Mexico.

Escharina ? distorta James. See Rhinopora verrucosa Hall.

ESCHAROPORA Hall. Genotype: Escharopora recta Hall.

1847. Escharopora. Hall, Pal. New York, I, p. 72.
1860. Escharopora. Eichwald, Lethæa Rossica, I, p. 435.
1889. Escharopora. Miller, North American Geol. Pal., p. 301.
1893. Escharopora. Ulrich, Geol. Minnesota, III, p. 167.
1896. Escharopora. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 279.
1886. Nicholsonia. Waagen and Wentzel, Pal. Indica, Ser. XIII, p. 874.
' Ptilodictya (in part). Various authors.

Escharopora acuminata (James).

1875. Ptilodictya acuminata. James, Catal. Foss. Cincinnati Group, p. 3.
1893. Escharopora acuminata. Ulrich, Geol. Minnesota, III, p. 167.
Cincinnati (Utica): Cincinnati, Ohio, and vicinity.

Escharopora angularis Ulrich.

1893. Escharopora angularis: Ulrich, Geol. Minnesota, III, p. 168, pl. xii, 1–4, 30, 31.

Trenton (Stones River): Minneapolis, Minnesota; High Bridge, Kentucky.

Escharopora (Ptilodictya) angusta Hall. See Ptilodictya angusta (Hall).

Escharopora (? Paleschara) bifoliata Hall. See Ptilodictya nebulosa (Hall).

Escharopora briareus (Ulrich).

1882. Ptilodictya briareus. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 165, pl. vii, 6–6*b*.

1893. Escharopora briareus. Ulrich, Geol. Minnesota, III, p. 167.

Trenton (Stones River): Lebanon, Shelbyville, and Columbia, Tennessee.

Obs. The form called by Safford Ptilodictya multiramis (not defined) is probably referable to this species.

Escharopora confluens Ulrich.

1893. Escharopora confluens. Ulrich, Geol. Minnesota, III, p. 171, pl. xiii, 1–11.

Trenton (Black River): Minneapolis, Minnesota.

Escharopora falciformis (Nicholson).

1849. Ptilodictya cruciformis. D'Orbigny, Prodr. de Pal., I, p. 21. (Not defined.)

1875. Ptilodictya falciformis. Nicholson, Ann. Mag. Nat. Hist., ser. 4, XV, p. 177, pl. xiv, 1–1*b*.

1875. Ptilodictya falciformis. Nicholson, Pal. Ohio, II, p. 259, pl. xxv, 7, 7*b*.

1875. Ptilodictya falciformis. Nicholson, Pal. Province Ontario, p. 13, fig. 2.

1883. Ptilodictya falciformis. (Van Cleve) Hall, Twelfth Ann. Rep. Indiana Geol. Nat. Hist., p. 265, pl. xii, 1.

1893. Escharopora falciformis. Ulrich, Geol. Minnesota, III, p. 167.

1881. Escharopora recta (not of Hall). Quenstedt, Roehren- und Sternkorallen, p. 94, pl. cxlvi, 69, 70.

1879. Crateripora lineata. Ulrich, Jour. Cincinnati Soc. Nat. Hist., II, p. 30, pl. vii, 28, 28*a*.

1879. Crateripora lineata var. expansa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., II, p. 30.

Trenton: Peterboro and Ottawa, Ontario (Nicholson).

Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.

Obs. Crateripora lineata and var. expansa were applied to the articulating basal socket of this species before its true nature was known.

Escharopora hilli (James).

1878. Ptilodictya Hilli. James, Paleontologist, No. 1, p. 4.

1882. Ptilodictya hilli. Ulrich, Jour. Cincinnati Nat. Hist., V, pl. vii, 7, 7*a*.

1885. Ptilodictya hilli. Nettleroth, Kentucky Fossil Shells, p. 30, pl. xxxv, 1, 2, 4, 5.

1893. Escharopora hilli. Ulrich, Geol. Minnesota, III, p. 167.

Cincinnati (Lorraine): Bank of the Ohio River at Cincinnati, Ohio (James); Boyle and Lincoln counties, Kentucky.

Escharopora libana (Safford).

1869. Ptilodictya ? libana. Safford, Geol. Tennessee, p. 286.

1893. Escharopora libana. Ulrich, Geol. Minnesota, III, p. 167.

Trenton (Stones River): Lebanon, Tennessee.

Obs. At present this is not a valid species, but we recognize it because Mr. Ulrich has the types and will figure and describe them under the above name.

Escharopora ? limitaris Ulrich.

1893. Escharopora ? limitaris. Ulrich, Geol. Minnesota, III, p. 172, figs. 9*a*–*b*, pl. xiii, 12, 13.

Trenton (Stones River and Black River): Minneapolis and Preston, Minnesota.

Escharopora lirata Hall. See Phænopora lirata (Hall) and Dicranopora granulosa (Hall).

Escharopora (Ptilodictya) lirata Hall. See Phænopora lirata (Hall) and Dicranopora granulosa (Hall).

Escharopora maculata (Ulrich).

1882. Ptilodictya maculata. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 163, pl. vi, 17, pl. vii, 4, 4*a*.

1890. Ptilodictya maculata. Ulrich, Geol. Surv. Illinois, VIII, fig. 6*b* (p. 317).

1893. Escharopora maculata. Ulrich, Geol. Minnesota, III, p. 167.

Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.

Escharopora nebulosa Hall. See Ptilodictya nebulosa (Hall).

Escharopora (Ptilodictya) nebulosa Hall. See Ptilodictya nebulosa (Hall).

Escharopora pavonia (D'Orbigny).

1849. Ptilodictya pavonia. D'Orbigny, Prodr. de Pal., I, p. 22.

1851. Chætetes pavonia. Milne-Edwards and Haime, Pol. Foss. Terr. Pal., p. 267, pl. xix, 4, 4*a*.

1860. Monticulipora pavonia. Milne-Edwards, Hist. Nat. des Corall., III, p. 276.

1866. Chætetes pavonia. Rominger, Proc. Acad. Nat. Sci. Philadelphia, p. 116.

1880. Heterodictya pavonia. Ulrich, Catal. Foss. Cincinnati Group, p. 10.

1881. Chætetes pavonia. Quenstedt, Roehren- und Sternkorallen, p. 79, pl. cxlvi, 21–25.

1881. Monticulipora (Monotrypa) pavonia. Nicholson, Genus Monticulipora, p. 195, fig. 41, pl. vi, 3, 3*a*.

1882. Ptilodictya pavonia. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 163, pl. vii, 3-3*d*.

1888. Monticulipora pavonia. James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 18.

1893. Escharopora pavonia. Ulrich, Geol. Minnesota, III, p. 167.

1895. Monticulipora pavonia. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 70.

1859. Cyclopora Jamesii. Prout, Trans. St. Louis Acad. Sci., I, p. 578.

1871. Stictopora clathratula. James, Catal. Foss. Cincinnati Group. (Not defined).

1874. Chætetes ? clathratulus. Nicholson, Quar. Jour. Geol. Soc. London, XXX, p. 509, pl. xxx, 1–1*b*.

1875. Chætetes ? clathratulus. Nicholson, Pal. Ohio, II, p. 209, pl. xxii, 2–2*b*.

1876. Chætetes ? clathratulus. Nicholson, Ann. Mag. Nat. Hist., ser. 4, XVIII, p. 91, pl. v, 9, 9*a*.

1886. Nicholsonia pavonica. Waagen and Wentzel, Pal. Indica, Ser. XIII, p. 874.

Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.

Escharopora ramosa (Ulrich).

1882. Ptilodictya ramosa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 164, pl. vii, 5, 5*a*.

1893. Escharopora ramosa. Ulrich, Geol. Minnesota, III, p. 167.

Escharopora ramosa (Ulrich)—Continued.

Trenton (Stones River): Lebanon, Tennessee; High Bridge, Kentucky. A variety, or perhaps new species, occurs in the Trenton of Deer Island, Lake Winnipeg, Canada.

Escharopora recta Quenstedt (not Hall). See Escharopora falciformis (Nicholson).

Escharopora recta Hall.

1847. Escharopora recta. Hall, Pal. New York, I, p. 73, pl. xxvi, 1*a*–*g*.
Trenton: Middleville and Jacksonburg, New York.

Escharopora recta-nodosa Hall.

1847. Escharopora recta var. nodosa. Hall, Pal. New York, I, p. 73, pl. xxvi, 2.
Trenton: Middleville and Jacksonburg, New York.

Escharopora subrecta (Ulrich).

1886. Ptilodictya subrecta. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Surv. Minnesota, p. 63.
1893. Escharopora subrecta. Ulrich, Geol. Minnesota, III, p. 168, pl. xii, 5–29.
Trenton (Black River): Minneapolis and other localities in Minnesota; Decorah, Iowa; Beloit, Wisconsin.

Escharopora tenuis Hall. See Phænopora tenuis (Hall).

Escharopora (Ptilodictya) tenuis Hall. See Phænopora tenuis (Hall).

EURYDICTYA Ulrich. Genotype: Eurydictya montifera Ulrich.

1890. Eurydictya. Ulrich, Geol. Surv. Illinois, VIII, pp. 389, 520.
1889. Eurydictya. (Ulrich in press), Miller, North American Geol. Pal., p. 301.
1893. Eurydictya. Ulrich, Geol. Minnesota, III, p. 138.
1897. Eurydictya. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 527.

Eurydictya calhounensis Ulrich.

1890. Eurydictya calhounensis. Ulrich, Geol. Surv. Illinois, VIII, p. 520, pl. xxx, 4–4*c*.
Trenton: Port au Gres, Calhoun County, Illinois.

Eurydictya montifera Ulrich.

1890. Eurydictya montifera. Ulrich, Geol. Surv. Illinois, VIII, p. 521, pl. xxx, 3–3*d*.
1897. Eurydictya montifera. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 80–82 (p. 528).
Cincinnati (Richmond); Wilmington, Illinois.

Eurydictya multipora (Hall).

1851. Phænopora multipora. Hall, Foster and Whitney's Rep. Geol. Lake Superior Land District, Part 2, p. 206, pl. xxiv, 1*a*, *b*.
1882. Phænopora ? multipora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 171, pl. viii, 7–7*b*.
1890. Eurydictya multipora. Ulrich, Geol. Surv. Illinois, VIII, p. 520.
1893. Eurydictya multipora (in part). Ulrich, Geol. Minnesota, III, p. 139, pl. vi, 9–11, pl. xiv, 9–11 (not pl. vii, 24, 29–31=Rhinidictya fidelis Ulrich).
1881. Ptilodictya antiqua. James, Paleontologist, No. 5, p. 37.
Trenton (Black River and Trenton): Escanaba River, Michigan (Hall); Burgin, Kentucky; Nashville, Tennessee; St. Paul, Minnesota.

Eurydictya sterlingensis Ulrich.

1890. Eurydictya sterlingensis. Ulrich, Geol. Surv. Illinois, VIII, p. 522, pl. xxx, 2, 2*a*.

Cincinnati (Richmond): Sterling and South Elgin, Illinois.

EUSPILOPORA Ulrich. Genotype: Euspilopora serrata Ulrich.

1890. Euspilopora. Ulrich, Geol. Surv. Illinois, VIII, p. 389.

1889. Euspilopora. (Ulrich in press), Miller, North American Geol. Pal., p. 301.

1896. Euspilopora. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 280.

1897. Euspilopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 528.

Euspilopora ? barrisi Ulrich.

1890. Euspilopora ? barrisi. Ulrich, Geol. Surv. Illinois, VIII, p. 527, pl. xliii, 5–5*d*.

1897. Euspilopora barrisi. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 85, 86 (p. 529).

Hamilton: Buffalo, Iowa.

Euspilopora lobata (Hall and Simpson).

1887. Stictopora lobata. Hall and Simpson, Pal. New York, VI, p. 256.

Hamilton: Reeds Corners, near Canandaigua Lake, New York.

Euspilopora palmipes (Hall).

1883. Stictopora palmipes. Hall, Trans. Albany Institute, X, p. 189 (abstract, 1881, p. 189).

1884. Stictopora palmipes. Hall, Rep. State Geologist New York for the year 1883, p. 41.

1887. Stictopora palmipes. Hall and Simpson, Pal. New York, VI, p. 255, pl. lx, 19, 20.

1890. Euspilopora palmipes. Ulrich, Geol. Surv. Illinois, VIII, p. 527.

1891. Stictopora palmipes. Hall, Tenth Ann. Rep. State Geologist New York for the year 1890, p. 48; Forty-fourth Ann. Rep. New York State Mus., p. 78.

1897. Stictopora palmipes. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. x, 20.

1899. Stictopora palmipes. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 174, fig. 69.

Hamilton: West Hamburg, Pavilion, and near Canandaigua Lake, New York.

Euspilopora serrata Ulrich.

1890. Euspilopora serrata. Ulrich, Geol. Surv. Illinois, VIII, p. 526, pl. xliii, 4–4*h*.

1897. Euspilopora serrata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 83, 84 (p. 529).

Hamilton: Buffalo, Iowa; near Alpena, Michigan.

EVACTINOPORA Meek and Worthen. Genotype: Evactinopora radiata Meek and Worthen.

1865. Evactinopora. Meek and Worthen, Proc. Acad. Nat. Sci. Philadelphia, p. 165.

1868. Evactinopora. Meek and Worthen, Geol. Surv. Illinois, III, p. 501.

1884. Evactinopora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, p. 42.

1889. Evactinopora. Miller, North American Geol. Pal., p. 301.

1890. Evactinopora. Ulrich, Geol. Surv. Illinois, VIII, pp. 387, 508.

1896. Evactinopora. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 280.

EVACTINOPORA Meek and Worthen—Continued.

1897. Evactinopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 529.

Evactinopora grandis Meek and Worthen.

1868. Evactinopora grandis. Meek and Worthen, Geol. Surv. Illinois, III, p. 503, pl. xv, 2*a*, *b*.
1890. Evactinopora grandis. Ulrich, Geol. Surv. Illinois, VIII, p. 511, pl. lxxiii, 4.
1894. Evactinopora grandis. Keyes, Missouri Geol. Surv., V, p. 19.
Burlington: Burlington, Iowa; Montezuma, Illinois.

Evactinopora quinqueradiata Ulrich.

1868. Evactinopora sexradiata (in part). Meek and Worthen, Geol. Surv. Illinois, III, pl. xvii, 3.
1890. Evactinopora quinqueradiata. Ulrich, Geol. Surv. Illinois, VIII, p. 510, pl. lxxiii, 1.
Burlington: Burlington, Iowa; Montezuma, Illinois.

Evactinopora radiata Meek and Worthen.

1865. Evactinopora radiata. Meek and Worthen, Proc. Acad. Nat. Sci. Philadelphia, p. 165.
1868. Evactinopora radiata. Meek and Worthen, Geol. Surv. Illinois, III, p. 502, pl. xvii, 2*a*, *b*.
1884. Evactinopora radiata. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, p. 42, pl. ii, 1-1*c*.
1890. Evactinopora radiata. Ulrich, Geol. Surv. Illinois, VIII, p. 509, pl. lxxiii, 3, 3*a*.
1894. Evactinopora radiata. Keyes, Missouri Geol. Surv., V, p. 19.
Keokuk: Missouri (Meek and Worthen); Kings Mountain, Kentucky (Ulrich).

Evactinopora sexradiata Meek and Worthen.

1868. Evactinopora sexradiata. Meek and Worthen, Geol. Surv. Illinois, III, p. 502, pl. xvii, 3.
1890. Evactinopora sexradiata. Ulrich, Geol. Surv. Illinois, VIII, p. 510, pl. lxxiii, 2-2*b*.
1894. Evactinopora sexradiata. Keyes, Missouri Geol. Surv., V, p. 18.
Burlington: Burlington, Iowa.

FAVICELLA Hall and Simpson. Genotype: Thallostigma inclusa Hall.

1887. Favicella. Hall and Simpson, Pal. New York, VI, p. xviii.
1889. Favicella. Miller, North American Geol. Pal., p. 301.
1897. Favicella. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 556.
1897. Fistuliporidra. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 606.
Obs. This genus may be a synonym for Selenopora.

Favicella inclusa (Hall).

1883. Thallostigma inclusa. Hall, Trans. Albany Institute, X, p. 188 (abstract, 1881, p. 188).
1884. Thallostigma inclusapora (in error). Hall, Rep. State Geologist New York for the year 1883, p. 33.
1887. Favicella inclusa. Hall and Simpson, Pal. New York, VI, p. 234, pl. lviii, 21-23.
1897. Favicella inclusa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxiv, 15-17.
Hamilton: York, New York.

Favicella tessellata (Hall and Simpson).

1887. Lichenalia tessellata. Hall and Simpson, Pal. New York, VI, p. 207.
1888. Lichenalia tessellata. Hall, Seventh Ann. Rep. State Geologist New York for the year 1887, pl. xv, 8-10; Forty-first Ann. Rep. New York State Mus., pl. xv, 8-10.
1897. Fistuliporidra tessellata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxii, 1-3.
Hamilton: Genesee Valley, New York.

Favosites Lamarck. At present considered a coral by most authors.

Favosites inexpectans Hall. See Monotrypa? helderbergiæ (Hall).

Favosites lycopodites Vanuxem. Not recognizable.

1842. Favosites lycopodites. Vanuxem, Geol. Rep. Third District New York, p. 46, fig. 3.
Trenton: New York.

Favosites minimus Hall (Thirty-second Ann. Rep. New York State Mus.). See Monotrypa spherica (Hall).

Favosites proximus Hall. See Monotrypa proxima (Hall).

Favosites sphericus Hall. See Monotrypa spherica (Hall).

FENESTELLA Lonsdale. (Not Fenestella Bolten 1798.) Genotype: Gorgonia antiqua Goldfuss. Accepted genotype: Fenestella plebeia McCoy.

1839. Fenestella. Lonsdale, Murchison's Silurian System, p. 677.
1841. Fenestella. Phillips, Pal. Foss., p. 22.
1844. Fenestella. McCoy, Synopsis Carb. Foss. Ireland, p. 200.
1845. Fenestella. Lonsdale, Russia and the Ural Mountains, I, Appendix A, p. 629.
1850. Fenestella. King, Mon. Perm. Foss., p. 34.
1854. Fenestella. McCoy, British Pal. Foss., p. 49.
1860. Fenestella. Eichwald, Lethæa Rossica, I, p. 356.
1874. Fenestella. Nicholson, Pal. Province Ontario, p. 104.
1881. Fenestella. Shrubsole, Quar. Jour. Geol. Soc. London, XXXVII, p. 179.
1882. Fenestella. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 150.
1883. Fenestella. Claypole, Quar. Jour. Geol. Soc. London, XXXIX, p. 31.
1885. Fenestella. Hall, Rep. State Geologist New York for the year 1884, p. 35.
1885. Fenestella. Waagen and Pichl, Pal. Indica, ser. XIII, pp. 773, 776.
1886. Fenestella. Ulrich, Contr. American Pal., I, p. 4.
1887. Fenestella. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 83.
1887. Fenestella. Hall and Simpson, Pal. New York, VI, p. xxii.
1889. Fenestella. Miller, North American Geol. Pal., p. 302.
1890. Fenestella. Ulrich, Geol. Surv. Illinois, VIII, pp. 395, 534.
1894. Fenestella. Počta, Syst. Sil. Bohême, VIII, t. 1, p. 40.
1895. Fenestella. Whidborne, Devon. Fauna England, (Pal. Soc. Publ.), II, pt. 4, p. 165.
1895. Fenestella. Simpson, Thirteenth Ann. Rep. State Geologist New York for the year 1893, pp. 687, 724; Forty-seventh Ann. Rep. New York State Mus., pp. 881, 918.
1896. Fenestella. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 281.
1897. Fenestella. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 500.
1899. Fenestella. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 159.
1850. Fenestrella (in error for Fenestella). D'Orbigny, Prodr. de Pal., I, p. 44.

FENESTELLA Lonsdale—Continued.

1874. Actinostoma. Young and Young, Quar. Jour. Geol. Soc. London, XXX, p. 681.

1885. Actinostoma. Vine, Proc. Yorkshire Geol. Polyt. Soc., IX, p. 84.

1895. Flabelliporina. Simpson, Thirteenth Ann. Rep. State Geol. New York for the year 1893, pp. 703, 724; Forty-seventh Ann. Rep. New York State Mus., pp. 897, 918.

1897. Flabelliporina. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 521.

Obs. See also remark on Palæocoryne Duncan and Jenkins.

Fenestella (Hemitrypa) acaulis Hall. See Unitrypa acaulis (Hall).

Fenestella (Unitrypa) acaulis Hall. See Unitrypa acaulis (Hall).

Fenestella (Unitrypa) acaulis var. inclinis Hall. See Unitrypa acaulis-inclinis (Hall).

Fenestella (Unitrypa) acclivis Hall and Simpson. See Unitrypa acclivis (Hall and Simpson).

Fenestella acmea Hall. See Semicoscinium acmeum (Hall).

Fenestella aculeata Hall. See Polypora aculeata (Hall).

Fenestella (Polypora) aculeata Hall. See Polypora aculeata (Hall).

Fenestella acuticosta Roemer.

1860. Fenestella acuticosta. Roemer, Sil. Fauna West. Tennessee, p. 30, pl. ii, 15, 15*a*.

Niagara: Perry County, Tennessee.

Fenestella adnata Hall. See Reteporidra adnata (Hall).

Fenestella (Polypora) adnata Hall. See Reteporidra adnata (Hall).

Fenestella adornata Hall and Simpson.

1883. Fenestella sp. (?). Hall, Rep. State Geologist New York for the year 1882, pl. xxii, 7, 8.

1887. Fenestella adornata. Hall and Simpson, Pal. New York, VI, p. 66, pl. xxii, 7, 8.

Lower Helderberg: Clarksville, New York.

Fenestella adraste Hall.

1879. Fenestella Adraste. Hall, Thirty-second Ann. Rep. New York State Mus., p. 169 (reprint, 1880, p. 31).

1883. Fenestella Adraste. Hall, Rep. State Geologist New York for the year 1882, pl. xx, 20–22, 19 sp. (?).

1887. Fenestella Adraste. Hall and Simpson, Pal. New York, VI, p. 48, pl. xx, 19–22.

Lower Helderberg: Clarksville, New York.

Fenestella æqualis Hall.

1883. Fenestella æqualis. Hall, Trans. Albany Institute, X, p. 173 (abstract, 1881, p. 31).

1887. Fenestella æqualis. Hall and Simpson, Pal. New York, VI, p. 112, pl. xlvi, 27–31.

Hamilton: Falls of the Ohio. (In the Trans. Albany Institute, X, p. 173, the locality is given Clarence Hollow, New York.)

Fenestella æsyle Hall.

1879. Fenestella Æsyle. Hall, Thirty-second Ann. Rep. New York State Mus., p. 166 (reprint, 1880, p. 28).

Fenestella æsyle Hall—Continued.

1883. Fenestella Æsyle. Hall, Rep. State Geologist New York for the year 1882, pl. xix, 11-13.

1887. Fenestella Æsyle. Hall and Simpson, Pal. New York, VI, p. 46, pl. xix, 11-13.

Lower Helderberg: Clarksville, New York.

Fenestella albida Hall.

1887. Fenestella albida. Hall, Sixth Ann. Rep. State Geologist New York for the year 1886, p. 48, pl. vii, 1-7.

1888. Fenestella albida. Ulrich, Bull. Denison Univ., IV, p. 65.

Waverly: Richfield, Ohio.

Fenestella albida var. richfieldensis Ulrich. See Fenestella richfieldensis Ulrich.

Fenestella althæa Hall.

1879. Fenestella Althæa. Hall, Thirty-second Ann. Rep. New York State Mus., p. 166 (reprint, 1880, p. 28).

1883. Fenestella althæa. Hall, Rep. State Geologist New York for the year 1882, pl. xix, 17-19.

1887. Fenestella althæa. Hall and Simpson, Pal. New York, VI, p. 48, pl. xix, 17-19.

Lower Helderberg: Albany County, New York.

Fenestella ambigua Hall. See Loculipora ambigua (Hall).

Fenestella angulata Hall. Not recognized.

1883. Fenestella angulata. Hall, Trans. Albany Institute, X, p. 170 (abstract, 1881, p. 28).

Upper Helderberg: New York.

Fenestella angustata Hall.

1884. Fenestella angustata. Hall, Thirty-sixth Ann. Rep. New York State Mus., p. 60.

1887. Fenestella angustata. Hall, Sixth Ann. Rep. State Geologist New York for the year 1886, p. 54.

1888. Fenestella angustata. Hall, Seventh Ann. Rep. State Geologist New York for the year 1887, pl. viii, 1-8; Forty-first Ann. Rep. New York State Mus., pl. viii, 1-8.

Hamilton: Alden, New York.

Fenestella (Hemitrypa) anonyma Hall. See Unitrypa anonyma (Hall).

Fenestella aperta Hall.

1887. Fenestella aperta. Hall, Sixth Ann. Rep. New York State Geologist for the year 1886, p. 58, pl. iv, 1-5.

1888. Fenestella aperta. Ulrich, Bull. Denison Univ., IV, p. 66.

Waverly: Richfield, Ohio.

Fenestella arkonensis Whiteaves.

1874. Fenestella tenuiceps (not of Hall). Nicholson, Pal. Province Ontario, p. 106, fig. 44.

1898. Fenestella Arkonensis. Whiteaves, Contr. Canad. Pal., I, p. 379.

Hamilton: Near Arkona, Ontario.

Fenestella Arta Hall. See Polypora arta (Hall).

Fenestella (Polypora) Arta Hall. See Polypora arta (Hall).

Fenestella (Polypora) aspectans Hall. See Polypora aspectans (Hall).

Fenestella aspectus (in error for aspectans) Hall. See Polypora aspectans (Hall).

Fenestella assita Hall.

1884. Fenestella assita. Hall, Thirty-sixth Ann. Rep. New York State Mus., p. 64.
1887. Fenestella assita. Hall, Sixth Ann. Rep. State Geologist New York for the year 1886, p. 56, pl. vii, 8-11.
Hamilton: York, New York.

Fenestella banyana Prout.

1859. Fenestella banyana. Prout, Trans. St. Louis Acad. Sci., I, p. 450, pl. xviii, 4-4*b*.
1894. Fenestella banyana. Keyes, Missouri Geol. Surv., V, p. 23.
Warsaw: Barretts Station, Missouri.

Fenestella bellistriata Hall.

1883. Fenestella bellastriata. Hall, Trans. Albany Institute, X, p. 63 (abstract, 1879, p. 7).
1882. Fenestella bellastriata. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 252.
1890. Fenestella bellistriata (?). Ulrich, Geol. Surv. Illinois, VIII, pl. liv, 2.
Niagara: Waldron, Indiana.

Fenestella bicornis Spencer. Not recognizable.

1884. Fenestella bicornis. Spencer, Trans. St. Louis Acad. Sci., IV, p. 604, pl. vii, 2.
1884. Fenestella bicornis. Spencer, Bull. Mus. Univ. State Missouri, I, p. 55, pl. vii, 2.
Clinton: Hamilton, Ontario.

Fenestella bifurca Ulrich. See Ptiloporella ? bifurca (Ulrich).

Fenestella bifurcata Prout. Not recognizable; name also preoccupied by Roemer.

1866. Fenestella bifurcata. Prout, Trans. St. Louis Acad. Sci., II, p. 411.
Geological horizon and locality not given.

Fenestella bigeneris Ulrich. See Fenestella perplexa Hall.

Fenestella biimbricata Hall. See Semicoscinium biimbricatum (Hall).

Fenestella (Hemitrypa) biordo Hall and Simpson. See Hemitrypa biordo (Hall).

Fenestella (Hemitrypa) biserialis Hall. See Hemitrypa biserialis (Hall).

Fenestella (Hemitrypa) biserialis var. exilis Hall. See Hemitrypa biserialis-exilis (Hall).

Fenestella biseriata Hall.

1883. Fenestella biseriata. Hall, Trans. Albany Institute, X, p. 166 (abstract, 1881, p. 25).
1887. Fenestella biseriata. Hall and Simpson, Pal. New York, VI, p. 113, pl. xlii, 16-18.
Upper Helderberg: Cherry Valley, New York.

Fenestella biserrulata Hall. See Semicoscinium biserrulatum (Hall).

Fenestella brevilinea Hall. See Semicoscinium exornatum (Hall).

Fenestella brevisulcata Hall. See Polypora brevisulcata (Hall).

Fenestella (Polypora) brevisulcata Hall. See **Polypora brevisulcata** (Hall).

Fenestella burlingtonensis Ulrich.

1888. Fenestella burlingtonensis. Ulrich, Bull. Denison Univ., IV, p. 71.
1890. Fenestella burlingtonensis. Ulrich, Geol. Surv. Illinois, VIII, p. 536. pl. xlix, 1, 1*a*.
Burlington: Burlington, Iowa.
Waverly: Lodi, Ohio.

Fenestella (Polypora) carinella Hall. See **Polypora carinella** (Hall and Simpson).

Fenestella cavernosa Ulrich.

1888. Fenestella cavernosa. Ulrich, Bull. Denison Univ., IV, p. 69, pl. xiii, 7-7*b*.
Waverly: Sciotoville, Ohio.

Fenestella celsipora Hall. See Polypora celsipora (Hall).

Fenestella (Polypora) celsipora Hall. See **Polypora celsipora** (Hall).

Fenestella celsipora var. minima Hall. See Polypora celsipora-minima (Hall).

Fenestella (Polypora) celsipora var. minima Hall. See **Polypora celsipora-minima** (Hall).

Fenestella celsipora var. minor Hall. See **Polypora celsipora-minor** (Hall).

Fenestella (Polypora) celsipora var. minor Hall. See **Polypora celsipora-minor** (Hall).

Fenestella cestriensis Ulrich.

1890. Fenestella cestriensis. Ulrich, Geol. Surv. Illinois, VIII, p. 547, pl. li, 5-5*b*.
1894. Fenestella cestriensis. Keyes, Missouri Geol. Surv., V, p. 24.
Chester: Chester, Kaskaskia, Anna, and other localities in Illinois; Sloans Valley and Litchfield, Kentucky.

Fenestella cinctuta Hall. See Reteporidra cinctuta (Hall).

Fenestella (Lyropora) cinctuta Hall. See **Reteporidra cinctuta** (Hall).

Fenestella cingulata Ulrich.

1890. Fenestella cingulata. Ulrich, Geol. Surv. Illinois, VIII, p. 543, pl. lii, 1-1*d*.
1894. Fenestella cingulata. Keyes, Missouri Geol. Surv., V, p. 23.
Keokuk: Nauvoo, Illinois; Keokuk, Iowa.

Fenestella (Loculipora) circumstata Hall and Simpson. See **Loculipora circumstata** (Hall and Simpson).

Fenestella clathrata Hall and Simpson.

1887. Fenestella clathrata. Hall and Simpson, Pal. New York, VI, p. 117.
Upper Helderberg: Ontario, Canada.

Fenestella cleia Hall.

1879. Fenestella Cleia. Hall, Thirty-second Ann. Rep. New York State Mus., p. 169 (reprint, 1880, p. 31).
1883. Fenestella Cleia. Hall, Rep. State Geologist New York for the year 1882, pl. xx, 14, 15.
1887. Fenestella Cleia. Hall and Simpson, Pal. New York, VI, p. 45, pl. xx, 14, 15.
Lower Helderberg: Clarksville, New York.

Fenestella Cleis Hall. See Semicoscinium ? cleis (Hall).

Fenestella (Reteporina) coalescens Hall and Simpson. See Reteporina coalescens (Hall and Simpson).

Fenestella (Hemitrypa) columellata Hall. See Hemitrypa columellata (Hall).

Fenestella compacta Hall. See Polypora compacta (Hall).

Fenestella (Polypora) compacta Hall and Simpson. See Polypora compacta (Hall).

Fenestella compressa Hall. See Polypora compressa (Hall).

Fenestella (Polypora) compressa Hall and Simpson. See Polypora compressa (Hall).

Fenestella compressa Ulrich.

1890. Fenestella compressa. Ulrich, Geol. Surv. Illinois, VIII, p. 539, pl. l, 2*a*.
Keokuk: Kings Mountain, Kentucky.

Fenestella compressa var. nododorsalis Ulrich. See Fenestella nododorsalis Ulrich.

Fenestella conferta Hall. See Polypora conferta (Hall).

Fenestella confertipora Hall and Simpson. See Ptiloporella ? bifurca (Ulrich).

Fenestella (Ptiloporina) conica Hall and Simpson. See Ptiloporina conica (Hall and Simpson).

Fenestella (Isotrypa) conjunctiva Hall and Simpson. See Isotrypa conjunctiva (Hall).

Fenestella (Hemitrypa) conjunctiva Hall. See Isotrypa conjunctiva (Hall).

Fenestella conradi Ulrich.

1890. Fenestella conradi. Ulrich, Geol. Surv. Illinois, VIII, p. 553, pl. lii, 8, 8*a*.
Upper Coal Measures: Near Red Oak, Iowa.

Fenestella (Unitrypa?) consimilis Hall and Simpson. See Isotrypa consimilis (Hall and Simpson).

Fenestella Coronis Hall. See Semicoscinium coronis (Hall).

Fenestella corticata Prout.

1859. Fenestella corticata. Prout, Trans. St. Louis Acad. Sci., I, p. 230.
Carboniferous: Organ Mountains, New Mexico.

Fenestella crebescens Hall. See Polypora crebescens (Hall).

Fenestella (Polypora) crebescens Hall and Simpson. See Polypora crebescens (Hall).

Fenestella crebripora Hall.

1874. Fenestella crebripora. Hall, Twenty-sixth Ann. Rep. New York State Mus., p. 95.
1879. Fenestella crebripora. Hall, Thirty-second Ann. Rep. New York State Mus., p. 167 (reprint, 1880, p. 29).
1883. Fenestella crebripora. Hall, Rep. State Geologist New York for the year 1882, pl. xx, 1-3.
1887. Fenestella crebripora. Hall and Simpson, Pal. New York, VI, p. 43, pl. xx, 1-3.
Lower Helderberg: Clarksville, New York.

Fenestella cribrosa Nicholson (not Hall). Name preoccupied by Hall. See Fenestella nicholsoni Whiteaves.

Fenestella (Hemitrypa) cribrosa Hall. See Hemitrypa cribrosa (Hall.)

Fenestella? cribrosa Hall.

1852. Fenestella cribrosa. Hall, Pal. New York, II, p. 166, pl. xlD, 3*a*, *b*.
Niagara: Lockport, New York.

Fenestella cultellata Hall. See Polypora shumardi Prout.

Fenestella (Polypora) cultellata Hall. See Polypora shumardi Prout.

Fenestella cultrata Hall.

1883. Fenestella cultrata. Hall, Trans. Albany Institute, X, p. 171 (abstract, 1881, p. 29).
1886. Fenestella cultrata. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. l, 1–5.
1887. Fenestella cultrata. Hall and Simpson, Pal. New York, VI, p. 119, pl. l, 1–5.
Hamilton: Falls of the Ohio.

Fenestella curvata Hall.

1884. Fenestella curvata. Hall, Thirty-sixth Ann. Rep. New York State Mus., p. 69.
1887. Fenestella curvata. Hall, Sixth Ann. Rep. State Geologist New York for the year 1886, p. 50, pl. vi, 1–9.
Hamilton: Moscow, New York.

Fenestella curvijunctura Hall.

1883. Fenestella curvijunctura. Hall, Trans. Albany Institute. X, p. 171 (abstract, 1881, p. 29).
1887. Fenestella curvijunctura. Hall and Simpson, Pal. New York, VI, p. 107, pl. xlvi, 1–5.
Hamilton: Falls of the Ohio.

Fenestella cylindracea Hall. See Polypora cylindracea (Hall).

Fenestella Davidsoni Nicholson. See Semicoscinium davidsoni (Nicholson.)

Fenestella delicata Meek.

1871. Fenestella delicata. Meek, Proc. Acad. Nat. Sci. Philadelphia, p. 159.
1875. Fenestella delicata. Meek, Pal. Ohio, II, p. 273, pl. x, 2*a–d*.
Waverly: Lodi, Ohio.

Fenestella delicatula Ulrich.

1890. Fenestella delicatula. Ulrich, Geol. Surv. Illinois, VIII, p. 549, pl. lii, 2.
Base of Coal Measures: Seville, Illinois.

Fenestella depressa Hall.

1883. Fenestella depressa. Hall, Trans. Albany Institute, X, p. 172 (abstract, 1881, p. 30).
1886. Fenestella depressa. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xlv, 16, 17.
1887. Fenestella depressa. Hall and Simpson, Pal. New York, VI, p. 111, pl. xlv, 16, 17.
Hamilton: Falls of the Ohio.

Fenestella dilata Prout.

1866. Fenestella dilata. Prout, Trans. St. Louis Acad. Sci., II, p. 411.
Hamilton: Locality not given (Buffalo, Iowa?).

Fenestella dispanda Hall.

1886. Fenestella dispanda. Hall, Fifth Ann. Rep. State Geologist New York for the year 1883, pl. xliv, 1–4.

1887. Fenestella dispanda. Hall and Simpson, Pal. New York, VI, p. 114, pl. xliv, 1–4.

Upper Helderberg: Western New York.

Fenestella (Ptiloporina) disparilis Hall and Simpson. See Ptiloporina disparilis (Hall and Simpson).

Fenestella distans Hall. See Polypora distans (Hall).

Fenestella (Polypora) distans Hall. See Polypora distans (Hall).

Fenestella elegans Hall.

1852. Fenestella elegans. Hall, Pal. New York, II, p. 164, pl. xlD, 1*a–g*.

Niagara: Lockport and Rochester, New York.

Fenestella (Hemitrypa) elegantissima Hall. See Unitrypa ? elegantissima (Hall).

Fenestella (Unitrypa) elegantissima Hall. See Unitrypa ? elegantissima (Hall).

Fenestella elevatipora Ulrich.

1890. Fenestella elevatipora. Ulrich, Geol. Surv. Illinois, VIII, p. 549, pl. li, 3, 3*a*.

1894. Fenestella elevatipora. Keyes, Missouri Geol. Surv., V, p. 25.

Chester: Chester, Illinois; Crittenden County, Kentucky.

Fenestella elongata Hall. See Polypora elongata (Hall).

Fenestella (Polypora) elongata Hall. See Polypora elongata (Hall).

Fenestella emaciata Hall.

1884. Fenestella emaciata. Hall, Thirty-sixth Ann. Rep. New York State Mus., p. 68.

1887. Fenestella emaciata. Hall, Sixth Ann. Rep. State Geologist New York, for the year 1886, p. 57.

1888. Fenestella emaciata. Hall, Seventh Ann. Rep. State Geologist New York, for the year 1887, pl. viii, 9–13; Forty-first Ann. Rep. New York State Mus., pl. viii, 9–13.

1899. Fenestella emaciata. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 159, fig. 47.

Hamilton: Shore of Seneca Lake, New York.

Fenestella ? erectipora Hall.

1883. Fenestella erectipora. Hall, Trans. Albany Institute, X, p. 174 (abstract, 1881, p. 33).

1886. Fenestella erectipora. Hall, Fifth Ann. Rep. State Geologist New York, for the year 1885, pl. l, 15, 17.

1887. Fenestella erectipora. Hall and Simpson, Pal. New York, VI, p. 118, pl. l, 15, 17.

Upper Helderberg: Near Buffalo, New York.

Fenestella Eudora Hall. See Polypora eudora (Hall).

Fenestella (Polypora) Eudora Hall and Simpson. See Polypora eudora (Hall).

Fenestella Eudora? Hall (1883). See Polypora ? stricta (Hall and Simpson).

Fenestella exigua Ulrich.

1890. Fenestella exigua. Ulrich, Geol. Surv. Illinois, VIII, p. 545, pl. li, 1, 1*a*
Warsaw: Monroe County, Illinois.

Fenestella eximia Winchell.

1866. Fenestella eximia. Winchell, Rep. Lower Penin. Michigan, p. 92.
Hamilton: Petoskey, Michigan.

Fenestella exornata Hall. See Semicoscinium exornatum (Hall).

Fenestella (Hemitrypa) fastigata Hall. See Unitrypa fastigata (Hall).

Fenestella (Unitrypa) fastigata Hall and Simpson. See Unitrypa fastigata (Hall).

Fenestella (Hemitrypa) favosa Hall. See Hemitrypa favosa (Hall).

Fenestella (Unitrypa) ficticius Hall and Simpson. See Unitrypa ficticia (Hall and Simpson).

Fenestella filiformis Nicholson. Not recognizable.

1874. Fenestella filiformis. Nicholson, Geol. Mag., new ser., I, p. 199, pl. ix, 24.
1874. Fenestella filiformis. Nicholson, Pal. Province Ontario, p. 107, fig. 45.
Upper Helderberg: Wainfleet, Ontario.
Obs. This form was founded upon the outer covering of some species of Unitrypa, which has probably since been described under another name.

Fenestella filistriata Ulrich.

1890. Fenestella filistriata. Ulrich, Geol. Surv. Illinois, VIII, p. 535, pl. xlix, 2, 2*a*.
1894. Fenestella filistriata. Keyes, Missouri Geol. Surv., V, p. 22.
Burlington: Burlington, Iowa; Montezuma, Pike County, Illinois.

Fenestella filitexta Winchell.

1866. Fenestella filitexta. Winchell, Rep. Lower Penin. Michigan, p. 92.
Hamilton: Petoskey, Michigan.

Fenestella fistulata Hall. See Polypora fistulata (Hall).

Fenestella (Polypora) fistulata Hall. See Polypora fistulata (Hall).

Fenestella flabelliformis Hall. See Polypora flabelliformis (Hall).

Fenestella (Polypora) flabelliformis Hall. See Polypora flabelliformis (Hall).

Fenestella flexuosa Ulrich. See Reteporina flexuosa (Ulrich).

Fenestella foliata Ulrich.

1888. Fenestella foliata. Ulrich, Bull. Denison Univ., IV, p. 67, pl. xiii, 4–4c.
Waverly: Cuyahoga Valley, Ohio.

Fenestella ? frequens Hall.

1888. Fenestella frequens. Hall, Seventh Ann. Rep. State Geologist New York for the year 1887, pl. ix, 12–15; Forty-first Ann. Rep. New York State Mus., pl. ix, 12–15.
Lower Helderberg: Clarksville, New York.

Fenestella funicula Ulrich.

1890. Fenestella funicula. Ulrich, Geol. Surv. Illinois, VIII, p. 542. pl. li, 6.
1894. Fenestella funicula. Keyes, Missouri Geol. Surv., V, p. 23.
Keokuk: Keokuk, Iowa.

Fenestella granifera Hall. See Semicoscinium graniferum (Hall).

Fenestella (Hemitrypa) granifera Hall. See Semicoscinium graniferum (Hall).

Fenestella granilinea Hall. See Polypora granilinea (Hall).

Fenestella (Polypora) granilinea Hall. See Polypora granilinea (Hall).

Fenestella granulosa Whitfield.

1878. Fenestella granulosa. Whitfield, Ann. Rep. Geol. Surv. Wisconsin for the year 1877, p. 68.
1882. Fenestella granulosa. Whitfield, Geol. Surv. Wisconsin, IV, p. 252, pl. xii, 1, 2.
1882. Fenestella oxfordensis. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 159, pl. vi, 13.
Cincinnati (Richmond): Delafield, Wisconsin; Oxford and Oregonia, Ohio.

Fenestella hemicycla Hall. See Semicoscinium labiatum (Hall).

Fenestella hemitrypa Prout. See Hemitrypa proutana Ulrich.

Fenestella herrickana Ulrich.

1888. Fenestella herrickana. Ulrich, Bull. Denison Univ., IV, p. 63, pl. xiii, 2–2*d*.
Waverly: Moot's Run and Richfield, Ohio.

Fenestella hestia Hall.

1879. Fenestella Hestia. Hall, Thirty-second Ann. Rep. New York State Mus., p. 168 (reprint, 1880, p. 30).
1883. Fenestella Hestia. Hall, Rep. State Geologist New York for the year 1882, pl. xx, 12, 13.
1887. Fenestella Hestia. Hall and Simpson, Pal. New York, VI, p. 45, pl. xx, 12, 13.
Lower Helderberg: Schoharie, New York.

Fenestella hexagonalis Hall. See Polypora hexagonalis (Hall).

Fenestella (Polypora) hexagonalis Hall. See Polypora hexagonalis (Hall).

Fenestella hexagonalis var. foraminulosa Hall. See Polypora hexagonalis-foraminulosa (Hall).

Fenestella (Polypora) hexagonalis var. foraminulosa Hall. See Polypora hexagonalis-foraminulosa (Hall).

Fenestella ? idalia Hall.

1874. Fenestella Idalia. Hall, Twenty-sixth Ann. Rep. New York State Mus., p. 95.
1879. Fenestella Idalia. Hall, Thirty-second Ann. Rep. New York State Mus., p. 170 (reprint, 1880, p. 32).
1883. Fenestella Idalia. Hall, Rep. State Geologist New York for the year 1882, pl. xxi, 6–9.
1887. Fenestella Idalia. Hall and Simpson, Pal. New York, VI, p. 52, pl. xxi, 6–9.
Lower Helderberg: Clarksville, New York.

Fenestella Idothea Hall. See Polypora idothea (Hall).

Fenestella (Polypora) Idothea Hall and Simpson. See Polypora idothea (Hall).

Fenestella inæqualis Ulrich.

1890. Fenestella inæqualis. Ulrich, Geol. Surv. Illinois, VIII, p. 554, pl. lii, 9, 9*a*, pl. liv, 4, 4*a*.
Upper Coal Measures: Ball's Mill, Sangamon County, Illinois.

Fenestella (Ptiloporella) inæqualis Hall and Simpson. See **Ptiloporella inæqualis** (Hall and Simpson).

Fenestella incongruens Quenstedt. Not recognizable.

1881. Fenestella incongruens. Quenstedt, Roehren- und Sternkorallen, p. 173, pl. cl, 3.
Upper Helderberg: Sandusky, Ohio.

Fenestella inflexa Hall. See Semicoscinium inflexum (Hall).

Fenestella intermedia Prout.

1858. Fenestella intermedia. Prout, Trans. St. Louis Acad. Sci., I, p. 231.
Carboniferous: Organ Mountains, New Mexico.

Fenestella interrupta Hall. See Semicoscinium interruptum (Hall).

Fenestella juncea Hall.

1879. Fenestella junceus. Hall, Thirty-second Ann. Rep. New York State Mus., p. 168 (reprint, 1880, p. 30).

1883. Fenestella junceus. Hall, Rep. State Geologist New York for the year 1882, pl. xx, 16–18.

1887. Fenestella junceus. Hall and Simpson, Pal. New York, VI, p. 44, pl. xx, 16–18.
Lower Helderberg: Clarksville, New York.

Fenestella labiata Hall. See Semicoscinium labiatum (Hall).

Fenestella (Polypora) lævistriata Hall. See Polypora lævistriata (Hall).

Fenestella largissima Hall. See Polypora largissima (Hall).

Fenestella (Polypora) largissima Hall. See Polypora largissima (Hall).

Fenestella (Hemitrypa) lata Hall. See Unitrypa lata (Hall).

Fenestella (Unitrypa) lata Hall and Simpson. See Unitrypa lata (Hall).

Fenestella laticarina Simpson. Not recognizable.

1897. Fenestella laticarina. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. ii, 12.
Obs. Simpson nowhere else alludes to this species, nor does he state the authorship. Geological horizon and locality are not given.

Fenestella (Ptiloporella) laticrescens Hall and Simpson. See Ptiloporella laticrescens (Hall and Simpson).

Fenestella latijunctura Hall. See Semicoscinium latijuncturum (Hall).

Fenestella latitruncata Hall. See Polypora latitruncata (Hall).

Fenestella (Polypora) latitruncata Hall. See Polypora latitruncata (Hall).

Fenestella (Archimedes) laxa Hall. See Archimedes laxus (Hall).

Fenestella levinodata Hall. See Polypora levinodata (Hall).

Fenestella (Polypora) levinodata Hall. See Polypora levinodata (Hall).

Fenestella (Polypora) Lilæa Hall. See Polypora lilæa (Hall).

Fenestella limbata Foerste.

1887. Fenestella limbatus. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 83, pl. vii, 10*a–d*.
Coal Measures: Flint Ridge, Ohio.

Fenestella limbatus var. remotus Foerste. See Fenestella remota Foerste.

Fenestella limitaris Ulrich.

1890. Fenestella limitaris. Ulrich, Geol. Surv. Illinois, VIII, p. 538, pl. xlix, 4, 4*a*.

1894. Fenestella limitaris. Keyes, Missouri Geol. Surv., V, p. 23.

Keokuk: Keokuk and Bentonsport, Iowa.

Fenestella lineanoda Hall. Not recognized.

1883. Fenestella lineanoda. Hall, Trans. Albany Institute, X, p. 163 (abstract, 1881, p. 22).

Upper Helderberg: Locality not given.

Fenestella (Tectulipora) loculata Hall. See Loculipora loculata (Hall).

Fenestella lodiensis Meek.

1875. Fenestella multiporata (McCoy) var. lodiensis. Meek, Pal. Ohio, II, p. 274, pl. x, 1*a*–*c*.

Waverly: Lodi, Ohio.

Fenestella lunulata Hall. See Semicoscinium lunulatum (Hall).

Fenestella lyelli Dawson.

1878. Fenestella lyelli. Dawson, Acadian Geol., ed. 3, p. 288, fig. 86.

Carboniferous: Windsor and Stewiacke, Nova Scotia.

Fenestella (Lyropora) lyra Hall. See Lyropora subquadrans-lyra (Hall).

Fenestella magnifica Nicholson.

1874. Fenestella magnifica. Nicholson, Geol. Mag., new ser., I, p. 197, pl. ix, 22.

1874. Fenestella magnifica. Nicholson, Pal. Province Ontario, p. 104, fig. 41*a*, *b*.

Upper Helderberg: Port Colborne, Ontario.

Fenestella marcida Hall.

1884. Fenestella marcida. Hall, Thirty-sixth Ann. Rep. New York State Mus., p. 61.

1887. Fenestella marcida. Hall, Sixth Ann. Rep. State Geologist New York for the year 1886, p. 51, pl. vi, 10–15.

Hamilton: Darien and Moscow, New York.

Fenestella marginalis Nicholson.

1874. Fenestella marginalis. Nicholson, Geol. Mag., new ser., I, p. 197, pl. ix, 23.

1874. Fenestella marginalis. Nicholson, Pal. Province Ontario, p. 105, fig. 42.

Upper Helderberg: Port Colborne, Ontario.

Fenestella meekana Ulrich.

1888. Fenestella meekana. Ulrich, Bull. Denison Univ., IV, p. 64, pl. xiii, 1–1*b*.

Waverly: Richfield and Lodi, Ohio.

Fenestella (Archimedes) Meekana Hall. See Archimedes meekanus (Hall).

Fenestella microtrema D'Orbigny. Not recognizable.

1850. Fenestrella microtrema. D'Orbigny, Prodr. de Pal., I, p. 45.

"Etats-Unis, Kentucky, failles de l'Ohio."

Fenestella mimica Ulrich.

1890. Fenestella mimica. Ulrich, Geol. Surv. Illinois, VIII, p. 552, pl. lii, 7, 7*a*.

Coal Measures: Seville, Illinois.

Fenestella modesta Ulrich.

1890. Fenestella modesta. Ulrich, Geol. Surv. Illinois, VIII, p. 550, pl. lii, 3–3*b*.
Coal Measures: Knox County and Seville, Illinois.

Fenestella multiplex Hall. See Polypora multiplex (Hall).

Fenestella (Polypora) multiplex Hall. See Polypora multiplex (Hall).

Fenestella multiporata (McCoy), var. lodiensis Meek. See Fenestella lodiensis Meek.

Fenestella multispinosa Ulrich.

1890. Fenestella multispinosa. Ulrich, Geol. Surv. Illinois, VIII, p. 540, pl. l, 3–3*d*.
1894. Fenestella multispinosa. Keyes, Missouri Geol. Surv., V, p. 23.
Keokuk: Bentonsport and Keokuk, Iowa; Kings Mountain, Kentucky.

Fenestella mutabilis Hall. See Polypora mutabilis (Hall).

Fenestella (Polypora) mutabilis Hall. See Polypora mutabilis (Hall).

Fenestella (Unitrypa) nana Hall and Simpson. See Unitrypa nana Hall and Simpson.

Fenestella nervata Nicholson. See Ptiloporella nervata (Nicholson).

Fenestella Nervia Hall. See Unitrypa nervia (Hall).

Fenestella (Hemitrypa) Nervia Hall. See Unitrypa nervia (Hall).

Fenestella (Unitrypa) Nervia Hall and Simpson. See Unitrypa nervia (Hall).

Fenestella (Hemitrypa) Nervia var. constricta Hall. See Unitrypa nervia-constricta (Hall).

Fenestella (Unitrypa) Nervia var. constricta Hall and Simpson. See Unitrypa nervia-constricta (Hall).

Fenestella nexa Hall. See Polypora nexa (Hall).

Fenestella (Polypora) nexa Hall. See Polypora nexa (Hall).

Fenestella ? nexilis Hall.

1888. Fenestella nexilis. Hall, Seventh Ann. Rep. State Geologist New York for the year 1887, pl. x, 14, 15; Forty-first Ann. Rep. New York State Mus., pl. x, 14, 15.
Upper Helderberg: Locality not given.

Fenestella nicholsoni Whiteaves.

1874. Fenestella cribrosa (not of Hall). Nicholson, Pal. Province Ontario, p. 106, fig. 43.
1898. Fenestella Nicholsoni. Whiteaves, Contr. Canad. Pal., I, p. 378.
Hamilton: Widder and near Arkona, Ontario.

Fenestella nododorsalis Ulrich.

1890. Fenestella compressa var. nododorsalis. Ulrich, Geol. Surv. Illinois, VIII, p. 540, pl. l, 2.
Keokuk: Kings Mountain, Kentucky.

Fenestella nodosa Prout.

1866. Fenestella nodosa. Prout, Trans. St. Louis Acad. Sci., II, p. 410.
Hamilton: Locality not given; (Buffalo, Iowa?).

Fenestella noe Hall and Simpson.

1883. Fenestella sp. Hall, Rep. State Geologist New York for the year 1882, pl. xiii, 19–22.

Fenestella noe Hall and Simpson—Continued.

1887. Fenestella Noe. Hall and Simpson, Pal. New York, VI, p. 47, pl. xiii, 19–22.
Lower Helderberg: Clarksville, New York.

Fenestella normalis Hall. Not recognizable.

1885. Fenestella normalis. Hall, Rep. State Geologist New York for the year 1884, pl. i, 8.
Geological horizon and locality not given.

Fenestella norwoodiana Prout.

1858. Fenestella Norwoodiana. Prout, Trans. St. Louis Acad. Sci., I, p. 233.
Carboniferous: Organ Mountains, New Mexico.

Fenestella obliqua Hall. See Polypora obliqua (Hall and Simpson).

Fenestella (Polypora) obliqua Hall and Simpson. See Polypora obliqua (Hall and Simpson).

Fenestella (Archimedes) Owenana Hall. See Archimedes owenanus (Hall).

Fenestella oxfordensis Ulrich. See Fenestella granulosa Whitfield.

Fenestella papillata Hall. See Polypora paxillata (Hall).

Fenestella parallela Hall (1881). Not recognized.

1883. Fenestella parallela. Hall, Trans. Albany Institute, X, p. 168 (abstract, 1881, p. 26).
Upper Helderberg: New York.

Fenestella parallela Hall (1888). See Loculipora loculata (Hall).

Fenestella parallela Hall.

1885. Fenestella parallela. Hall, Rep. State Geologist New York for the year 1884, pl. i, 7.
1886. Fenestella parallela. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xliv, 8–18.
1887. Fenestella parallela. Hall and Simpson, Pal. New York, VI, p. 107, pl. xliv, 8–18.
Upper Helderberg: Near Buffalo, New York.

Fenestella parvulipora Hall.

1876. Fenestella parvulipora. Hall, Twenty-eighth Ann. Rep. New York State Museum (documentary edition), pl. xii, 1–9; ibid. (Museum edition), 1879, p. 123, pl. xii, 1–9.
1882. Fenestella parvulipora. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 249, pl. xi, 1–9.
Niagara: Waldron, Indiana.

Fenestella patellifera Ulrich. See Fenestella variapora Hall.

Fenestella paxillata Hall. See Polypora paxillata (Hall).

Fenestella (Polypora) paxillata Hall and Simpson. See Polypora paxillata (Hall).

Fenestella peculiaris Hall.

1883. Fenestella peculiaris. Hall, Rep. State Geologist New York for the year 1882, pl. (42) xxxiii, 19–21.
1887. Fenestella peculiaris. Hall and Simpson, Pal. New York, VI, p. 113, pl. xlii, 19–21.
Upper Helderberg: Near Caledonia, New York.

Fenestella perangulata Hall. See Polypora perangulata (Hall).

Fenestella (Polypora) perangulata Hall. See Polypora perangulata (Hall).

Fenestella perelegans Meek.

1872. Fenestella perelegans. Meek, Pal. Eastern Nebraska, p. 153, pl. vii, 3-3*d*. (Proposed under F. Shumardii Meek (not Prout).)
1885. Fenestella perelegans. Waagen and Pichl, Pal. Indica, Ser. XIII, p. 777, pl. lxxxvii, 1-3.
1894. Fenestella shumardi (not of Prout). Keyes, Missouri Geol. Surv., V, p. 24, pl. xxxiv, 2*a*, *b*.
1896. Fenestella shumardi (not of Prout). Smith, Proc. American Phil. Soc., xxxv, p. 237.
Coal Measures: Nebraska City, Nebraska; Poteau Mountain, Indian Territory (Smith).

Fenestella perforata Hall. See Loculipora perforata (Hall).

Fenestella (Loculipora) perforata Hall. See Loculipora perforata (Hall).

Fenestella permarginata Hall. See Semicoscinium permarginatum (Hall).

Fenestella perminuta Ulrich.

1890. Fenestella perminuta. Ulrich, Geol. Surv. Illinois, VIII, p. 551, pl. lii, 4-4*b*.
Coal Measures: Seville, Illinois.

Fenestella (Hemitrypa) pernodosa Hall. See Unitrypa pernodosa (Hall).

Fenestella (Unitrypa) pernodosa Hall. See Unitrypa pernodosa (Hall).

Fenestella perplexa Hall.

1883. Fenestella (Hemitrypa) perplexa. Hall, Trans. Albany Institute, X, p. 175 (abstract, 1881, p. 33).
1887. Fenestella perplexa. Hall and Simpson, Pal. New York, VI, p. 130.
1888. Fenestella perplexa. Hall, Seventh Ann. Rep. State Geologist New York for the year 1887, pl. xiv, 5; Forty-first Ann. Rep. New York State Mus., pl. xiv, 5.
1886. Fenestella bigeneris. Ulrich, Contr. American Pal., I, p. 11, pl. ii, 1, 1*a*.
Hamilton: Falls of the Ohio.

Fenestella (Hemitrypa) perplexa Hall. See Fenestella perplexa Hall.

Fenestella pertenuis Hall (1881). See Fenestella proutana Miller.

Fenestella pertenuis Hall.

1883. Fenestella pertenuis. Hall, Trans. Albany Institute, X, p. 62 (abstract, 1879, p. 6).
1882. Fenestella pertenuis. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 251.
Niagara: Waldron, Indiana.

Fenestella perundata Hall. See Reteporidra perundata (Hall).

Fenestella (Polypora) perundata Hall and Simpson. See Reteporidra perundata (Hall).

Fenestella perundulata Hall. See Reteporina perundulata (Hall).

Fenestella philia Hall.

1879. Fenestella Philia. Hall, Thirty-second Ann. Rep. New York State Mus., p. 168 (reprint, 1880, p. 30).

1883. Fenestella Philia. Hall, Rep. State Geologist New York for the year 1882, pl. xx, 9–11.

1887. Fenestella Philia. Hall and Simpson, Pal. New York, VI, p. 50, pl. xx, 9–11.

Lower Helderberg: Clarksville, New York.

Fenestella (Ptiloporina) pinnata Hall and Simpson. See Ptiloporina pinnata Hall and Simpson.

Fenestella planiramosa Hall (Lower Helderberg). See Polypora compressa (Hall).

Fenestella planiramosa Hall.

1884. Fenestella planiramosa. Hall, Thirty-sixth Ann. Rep. New York State Mus., p. 62.

1887. Fenestella planiramosa. Hall, Sixth Ann. Rep. State Geologist New York for the year 1886, p. 44, pl. i, 1–13.

1899. Fenestella planiramosa. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 159, fig. 48.

Hamilton: Bellona and Eighteenmile Creek, New York.

Fenestella plumosa Prout. See Hemitrypa plumosa (Prout).

Fenestella popeana Prout.

1858. Fenestella Popeana. Prout, Trans. St. Louis Acad. Sci., I, p. 229; ibid., p. 388.

Permian: Guadalupe Mountains, New Mexico.

Fenestella porosa Hall. See Polypora porosa (Hall.)

Fenestella (Polypora) porosa Hall. See Polypora porosa (Hall).

Fenestella præcursor Hall. See Unitrypa præcursor (Hall).

Fenestella (Unitrypa) præcursor Hall. See Unitrypa præcursor (Hall).

Fenestella prisca? Hall (not Lonsdale nor Goldfuss). See Semicoscinium tenuiceps (Hall).

Fenestella proceritas Hall and Simpson.

1887. Fenestella proceritas. Hall and Simpson, Pal. New York, VI, p. 115, pl. xlvi, 32, 35, 36.

Upper Helderberg: Walpole, Ontario.

Fenestella (Unitrypa) projecta Hall and Simpson. See Unitrypa acaulis (Hall).

Fenestella prolixa Hall.

1883. Fenestella prolixa. Hall, Trans. Albany Institute, X, p. 64 (abstract, 1879, p. 8).

1882. Fenestella prolixa. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 253.

Niagara: Waldron, Indiana.

Fenestella propria Hall. See Polypora propria (Hall).

Fenestella (Polypora) propria Hall and Simpson. See Polypora propria (Hall).

Fenestella proutana Miller.

1883. Fenestella pertenuis. Hall, Trans. Albany Institute, X, p. 171 (abstract, 1881, p. 29).

1886. Fenestella pertenuis. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xlv, 22, 23.

1887. Fenestella pertenuis. Hall and Simpson, Pal. New York, VI, p. 106, pl. xlv, 22, 23.

1883. Fenestella proutana. Miller, American Pal. Foss., ed. 2, p. 291. (Name proposed for F. pertenuis, preoccupied by Hall for a species from the Niagara at Waldron, Indiana).

Hamilton: Falls of the Ohio.

Fenestella pulchella Ulrich.

1886. Fenestella pulchella. Ulrich, Contr. American Pal., I, p. 9, pl. i, 4, 4*a*.

Hamilton: Falls of the Ohio.

Fenestella punctostriata Hall. See Polypora punctostriata (Hall).

Fenestella quadrangula Hall.

1884. Fenestella quadrangula. Hall, Thirty-sixth Ann. Rep. New York State Mus., p. 68.

1887. Fenestella quadrangula. Hall, Sixth Ann. Rep. State Geologist New York for the year 1886, p. 47, pl. iii, 7-12.

Hamilton: Darien, New York.

Fenestella quadrangularis Hall. See Polypora quadrangularis (Hall).

Fenestella (Polypora) quadrangularis Hall. See Polypora quadrangularis (Hall).

Fenestella quadrula Hall. See Unitrypa quadrula (Hall).

Fenestella (Lyropora) quincuncialis Hall. See Lyropora quincuncialis (Hall).

Fenestella regalis Ulrich.

1890. Fenestella regalis. Ulrich, Geol. Surv. Illinois, VIII, p. 538, pl. l, 1, 1*a*, pl. liv, 5.

Keokuk: Kings Mountain, Kentucky.

Fenestella regalis-macra Ulrich.

1888. Fenestella regalis var. macra. Ulrich, Bull. Denison Univ., IV, p. 70, pl. xiii, 5, 5*a*.

Waverly: Richfield, Ohio.

Fenestella remota Foerste.

1887. Fenestella limbatus var. remotus. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 84, pl. vii, 11.

1887. Fenestella remota. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 87.

Coal Measures: Flint Ridge, Ohio.

Fenestella (Lyropora) retrorsa Meek and Worthen. See Lyropora retrorsa (Meek and Worthen).

Fenestella rhombifera Hall. See Reteporina rhombifera (Hall).

Fenestella (Reteporina) rhombifera Hall and Simpson. See Reteporina rhombifera (Hall).

Fenestella richfieldensis Ulrich.

1888. Fenestella albida var. richfieldensis. Ulrich, Bull. Denison Univ., IV, p. 66, pl. xiii, 3-3*c*.

Waverly: Richfield, Ohio.

Fenestella rigida Hall. See Polypora rigida (Hall).

Fenestella (Polypora) rigida Hall. See Polypora rigida (Hall).

Fenestella robusta Hall. See Polypora robusta (Hall).

Fenestella (Polypora) robusta Hall. See Polypora robusta (Hall).

Fenestella rudis Ulrich.

1890. Fenestella rudis. Ulrich, Geol. Surv. Illinois, VIII, p. 537, pl. xlix, 3-3*d*.
1894. Fenestella rudis. Keyes, Missouri Geol. Surv., V, p. 23, pl. xxxiv, 5.
Keokuk: Keokuk and Bentonsport, Iowa.
Warsaw: Warsaw and Nauvoo, Illinois.

Fenestella (Polypora) rustica Hall and Simpson. See Polypora rustica (Hall and Simpson).

Fenestella scalaris Hall. See Unitrypa scalaris (Hall).

Fenestella (Unitrypa) scalaris Hall. See Unitrypa scalaris (Hall).

Fenestella sculptilis Ulrich. See Fenestella stellata Hall.

Fenestella semirotunda Hall. See Semicoscinium semirotundum (Hall).

Fenestella (Polypora) separata Hall. See Polypora separata (Hall).

Fenestella serrata Hall.

1883. Fenestella serrata. Hall, Trans. Albany Institute, X, p. 170 (abstract, 1881, p. 28).
1887. Fenestella serrata. Hall and Simpson, Pal. New York, VI, p. 110, pl. xlvii, 11-19.
Hamilton: Falls of the Ohio.

Fenestella serratula Ulrich.

1890. Fenestella serratula. Ulrich, Geol. Surv. Illinois, VIII, p. 544, pl. l, 5-5c.
1894. Fenestella serratula. Keyes, Missouri Geol. Surv., V, p. 23.
Keokuk: Nauvoo, Illinois.
Warsaw: Warsaw and Monroe County, Illinois.
St. Louis: Caldwell, Lyon, and Crittenden counties, Kentucky.
Chester: Sloans Valley, Kentucky.

Fenestella sevillensis Ulrich.

1890. Fenestella sevillensis. Ulrich, Geol. Surv. Illinois, VIII, p. 552, pl. lii, 6, 6*a*.
Base of Coal Measures: Seville, Illinois.

Fenestella shumardi Prout.

1858. Fenestella Shumardii. Prout, Trans. St. Louis Acad. Sci., I, p. 232.
Carboniferous: Organ Mountains, New Mexico.

Fenestella Shumardii Meek and other authors (not Prout). See Fenestella perelegans Meek.

Fenestella singularis Hall. See Fenestella singularitas Hall.

Fenestella singularitas Hall.

1883. Fenestella singularis. Hall, Trans. Albany Institute, X, p. 171 (Fenestella singularitas, abstract, 1881, p. 29).
1887. Fenestella singularitas. Hall and Simpson, Pal. New York, VI, p. 114, pl. xlvi, 12-16.
Hamilton: Falls of the Ohio.

Fenestella (Ptiloporina) sinistralis Hall and Simpson. See Ptiloporina sinistralis (Hall and Simpson).

Fenestella sinuosa Hall.

1886. Fenestella sinuosa. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xliv, 5, 6.
1887. Fenestella sinuosa. Hall and Simpson, Pal. New York, VI, p. 116, pl. xliv, 5, 6.
Upper Helderberg: Near Caledonia, New York.

Fenestella spio Hall and Simpson.

1883. Fenestella sp. (?). Hall, Rep. State Geologist New York for the year 1882, pl. xix, 16.
1887. Fenestella Spio. Hall and Simpson, Pal. New York, VI, p. 47, pl. xix, 16.
Lower Helderberg: Clarksville, New York.

Fenestella spissa Hall.

1887. Fenestella spissa. Hall, Sixth Ann. Rep. State Geologist New York for the year 1886, p. 59.
Hamilton: West Bloomfield, New York.

Fenestella stellata Hall.

1883. Fenestella stellata. Hall, Trans. Albany Institute, X, p. 170 (abstract, 1881, p. 29).
1886. Fenestella stellata. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xlv, 14, 15.
1887. Fenestella stellata. Hall and Simpson, Pal. New York, VI, p. 109, pl. xlv, 14, 15, pl. xlvii, 20-36.
1897. Fenestella stellata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. ii, 5.
1886. Fenestella sculptilis. Ulrich, Contr. American Pal., I, p. 10, pl. i, 3.
Hamilton: Falls of the Ohio.

Fenestella (Hemitrypa) stipata Hall. See Unitrypa tegulata (Hall).

Fenestella (Unitrypa) stipata Hall. See Unitrypa tegulata (Hall).

Fenestella strata Hall. See Reteporina striata (Hall).

Fenestella (Reteporina) striata Hall. See Reteporina striata (Hall).

Fenestella striatopora Hall. See Polypora striatopora (Hall).

Fenestella (Polypora) striatopora Hall. See Polypora striatopora (Hall).

Fenestella (Polypora) stricta Hall and Simpson. See Polypora? stricta (Hall and Simpson).

Fenestella subflexuosa Ulrich.

1888. Fenestella subflexuosa. Ulrich, Bull. Denison Univ., IV, p. 68, pl. xiii, 6.
Waverly: Cuyahoga Falls, Ohio.

Fenestella submutans Hall. See Polypora submutans (Hall).

Fenestella (Polypora) submutans Hall. See Polypora submutans (Hall).

Fenestella (Lyropora) subquadrans Hall. See Lyropora subquadrans (Hall).

Fenestella subretiformis Prout.

1858. Fenestella subretiformis. Prout, Trans. St. Louis Acad. Sci., I, p. 233.
Carboniferous: Organ Mountains, New Mexico.

Fenestella (Hemitrypa) substriata Hall. See Unitrypa substriata (Hall).

Fenestella subtortilis Hall. See Semicoscinium subtortile (Hall).

Fenestella (Archimedes) Swallovana Hall. See Archimedes swallovanus (Hall).

Fenestella sylvia Hall.
1874. Fenestella Sylvia. Hall, Twenty-sixth Ann. Rep. New York State Mus., p. 96.
1879. Fenestella Sylvia. Hall, Thirty-second Ann. Rep. New York State Mus., p. 167 (reprint, 1880, p. 29).
1883. Fenestella Sylvia. Hall, Rep. State Geologist New York for the year 1882, pl. xx, 4-7.
1887. Fenestella Sylvia. Hall and Simpson, Pal. New York, VI, p. 49, pl. xx, 4-7.
Lower Helderberg: Clarksville, New York.

Fenestella tantulus Hall. See Polypora tantula (Hall).

Fenestella (Hemitrypa) tegulata Hall. See Unitrypa tegulata (Hall).

Fenestella (Unitrypa) tegulata Hall. See Unitrypa tegulata (Hall).

Fenestella tenax Ulrich.
1888. Fenestella tenax. Ulrich, Bull. Denison Univ., IV, p. 71.
1890. Fenestella tenax. Ulrich, Geol. Surv. Illinois, VIII, p. 546, pl. li, 2-2*e*.
1894. Fenestella tenax. Keyes, Missouri Geol. Surv., V, p. 24.
Warsaw: Warsaw, and Monroe County, Illinois.
Chester: Chester and Kaskaskia, Illinois; Sloans Valley, Kentucky.
Waverly: Cuyahoga County, Ohio.

Fenestella tenella Hall.
1886. Fenestella tenella. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xlv, 18, 19.
1887. Fenestella tenella. Hall and Simpson, Pal. New York, VI, p. 105, pl. xlv, 18, 19.
Hamilton: Falls of the Ohio.

Fenestella tenuiceps Hall. See Semicoscinium tenuiceps (Hall).

Fenestella tenuiceps Nicholson (not Hall). See Fenestella arkonensis Whiteaves.

Fenestella tenuis Hall.
1852. Fenestella tenuis. Hall, Pal. New York, II, p. 51, pl. xix, 5*a*-*c*.
Clinton: Wolcott Furnace, Whiting's Mill, Wayne County, New York.

Fenestella Thyene Hall. See Semicoscinium thyene (Hall).

Fenestella torta Hall. See Semicoscinium tortum (Hall).

Fenestella (Unitrypa) transversa Hall and Simpson. See Unitrypa tegulata (Hall).

Fenestella triserialis Ulrich.
1890. Fenestella triserialis. Ulrich, Geol. Surv. Illinois, VIII, p. 541, pl. l, 4, 4*a*.
Keokuk: Kings Mountain, Kentucky.

Fenestella trituberculata Prout.
1858. Fenestella trituberculata. Prout, Trans. St. Louis Acad. Sci., I, p. 228.
Carboniferous: Organ Mountains, New Mexico.

Fenestella tuberculata Hall and Simpson.
1887. Fenestella tuberculata. Hall and Simpson, Pal. New York, VI, p. 116, pl. xlvi, 25, 26, 33, 34.
Upper Helderberg: Ontario.

Fenestella varia Hall. See Polypora varia (Hall).

Fenestella variabilis Prout.
1858. Fenestella variabilis. Prout, Trans. St. Louis Acad. Sci., I, p. 238.
Carboniferous: Organ Mountains, New Mexico.

Fenestella variapora Hall.

1883. Fenestella variapora. Hall, Trans. Albany Institute, X, p. 170 (abstract, 1881, p. 28).
1886. Fenestella variapora. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xlv, 1-13.
1887. Fenestella variapora. Hall and Simpson, Pal. New York, VI, p. 104, pl. xxxv, 17, pl. xlv, 1-13.
1897. Fenestella variapora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. ii, 18.
1886. Fenestella patellifera. Ulrich, Contr. American Pal., I, p. 8, pl. i, 1, 1a.
Hamilton: Falls of the Ohio.

Fenestella vera Ulrich.

1890. Fenestella vera. Ulrich, Geol. Surv. Illinois, VIII, p. 535, pl. xliv, 1, 1*a*, pl. liv, 3.
1892. Fenestella vera. Whiteaves, Contr. Canadian Pal., I, p. 279, pl. xxxvi, 3, 3*a*.
Hamilton: Buffalo, Iowa; Lake Winnipegosis, Canada (Whiteaves).

Fenestella verrucosa Hall.

1883. Fenestella (Polypora) verrucosa. Hall, Rep. State Geologist New York for the year 1882, pl. (42) xxxiii, 11.
1887. Fenestella verrucosa. Hall and Simpson, Pal. New York, VI, p. 110, pl. xlii, 11, pl. xlvi, 22-24.
Hamilton: Falls of the Ohio.

Fenestella (Polypora) verrucosa Hall. See Fenestella verrucosa Hall.

Fenestella wortheni Ulrich.

1890. Fenestella wortheni. Ulrich, Geol. Surv. Illinois, VIII, p. 551, pl. lii, 5, 5*a*.
Base of Coal Measures: Seville, Illinois.

Fenestella (Archimedes) Wortheni Hall. See Archimedes wortheni (Hall).

FENESTRALIA Prout. Genotype: Fenestralia sancti-ludovici Prout.

1858. Fenestralia. Prout, Trans. St. Louis Acad. Sci., I, p. 235.
1882. Fenestralia. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 150.
1885. Fenestralia. Waagen and Pichl, Pal. Indica, Ser. XIII, p. 773.
1885. Fenestralia. Hall, Rep. State Geologist New York for the year 1884, p. 37.
1886. Fenestralia. Ulrich, Contr. American Pal., I, p. 5.
1889. Fenestralia. Miller, North American Geol. Pal., p. 305.
1890. Fenestralia. Ulrich, Geol. Surv. Illinois, VIII, pp. 396, 604.
1895. Fenestralia. Simpson, Thirteenth Ann. Rep. State Geologist New York for the year 1893, pp. 717, 724; Forty-seventh Ann. Rep. New York State Mus., pp. 911, 918.
1896. Fenestralia. Ulrich, Zittel's Textb. Pal. (Eng. ed.), p. 282.
1897. Fenestralia. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pp. 502, 520.

Fenestralia compacta Ulrich.

1890. Fenestralia sancti-ludovici var. compacta. Ulrich, Geol. Surv. Illinois, VIII, p. 605, pl. lix, 1.
St. Louis: Elizabethtown, Kentucky.

Fenestralia sancti-ludovici Prout.

1858. Fenestralia St. Ludovici. Prout, Trans. St. Louis Acad. Sci., I, p. 235, pl. xv, 1, 1*a*.

Fenestralia sancti-ludovici Prout—Continued.

1890. Fenestralia sancti-ludovici. Ulrich, Geol. Surv. Illinois, VIII, p. 604, pl. lv, 5.
1894. Fenestralia sancti-ludovici. Keyes, Missouri Geol. Surv., V, p. 30.
1895. Fenestralia St. Ludovici. Simpson, Thirteenth Ann. Rep. State Geologist New York for the year 1893, fig. 62 (p. 717).
1897. Fenestralia St. Ludovici. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 42, 43 (p. 503).
Warsaw: Barrett's Station, Missouri; Warsaw and Columbia, Illinois.
St. Louis: St. Louis, Missouri; Alton, Illinois.

Fenestralia sancti-ludovici var. compacta Ulrich. See Fenestralia compacta Ulrich.

FENESTRAPORA Hall. Genotype: Fenestrapora biperforata Hall.

1885. Fenestrapora. Hall, Rep. State Geologist New York for the year 1884, p. 36.
1887. Fenestrapora. Hall and Simpson, Pal. New York, VI, p. xxii.
1889. Fenestrapora. Miller, North American Geol. Pal., p. 305.
1890. Fenestrapora. Ulrich, Geol. Surv. Illinois, VIII, pp. 395, 557.
1895. Fenestrapora. Simpson, Thirteenth Ann. Rep. State Geologist New York for the year 1893, pp. 690, 701, 725; Forty-seventh Ann. Rep. New York State Mus., pp. 884, 895, 919.
1896. Fenestrapora. Ulrich, Zittel's Textb. Pal. (Eng. ed.), p. 282.
1897. Fenestrapora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pp. 506, 520.

Fenestrapora biperforata Hall.

1885. Fenestrapora biperforata. Hall, Rep. State Geologist New York for the year 1884, pl. ii, 17.
1887. Fenestrapora biperforata. Hall and Simpson, Pal. New York, VI, p. 286, pl. lxvi, 34–39.
1897. Fenestrapora biperforata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. iii, 7–12.
Hamilton: Moscow, Livingston County, and other localities in central and western New York.

Fenestrapora infraporosa (Ulrich).

1886. Semicoscinium infraporosa. Ulrich, Contr. American Pal., I, p. 14, pl. i, 6–6*b*.
1889. Fenestrapora infraporosa. Miller, North American Geol. Pal., p. 305.
Hamilton: Falls of the Ohio.

Fenestrapora largior (Hall) Simpson.

1897. Fenestrapora largior Hall. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. iii, 6. (Not described.)
Geological horizon and locality not given.
Obs. Simpson ascribes this species to Hall, but we have been unable to find it described in any of Hall's works.

Fenestrapora occidentalis Ulrich.

1890. Fenestrapora occidentalis. Ulrich, Geol. Surv. Illinois, VIII, p. 558, pl, xliv, 2, 2*a*, pl. liv, 7–7*e*.
Hamilton: Buffalo, Iowa.

Fenestrella D'Orbigny. In error for Fenestella.

Fenestrellina D'Orbigny. Not recognized.

1850. Fenestrellina. D'Orbigny, Prod. de Pal., I, p. 153.
1885. Fenestrellina. Hall, Rep. State Geologist New York for the year 1884 p. 36.

Obs. Hall's Fenestrellina (D'Orbigny's?) = Fenestella.

Fistulicella Simpson. See Pinacotrypa Ulrich.

Fistulicella plana Simpson. See Pinacotrypa plana (Hall).

FISTULIPORA McCoy. Genotype: Fistulipora minor McCoy=Calamopora incrustans Phillips.

1850. Fistulipora. McCoy, Ann. Mag. Nat. Hist., ser. 2, III, p. 131.
1851. Fistulipora. Milne-Edwards and Haime, Pol. Foss. Terr. Pal., p. 219.
1854. Fistulipora. McCoy, Brit. Pal. Foss., p. 11.
1854. Fistulipora. McCoy, Contr. Brit. Pal., p. 99.
1860. Fistulipora. Milne-Edwards, Hist. Nat. des Corall., III, p. 238.
1874. Fistulipora. Nicholson, Pal. Province Ontario, p. 63.
1876. Fistulipora. Dybowski, Verh. Mineral. Gesellschaft St. Petersburg, (2) X, p. 180.
1879. Fistulipora. Nicholson, Pal. Tabulate Corals, p. 292.
1881. Fistulipora. Nicholson, Genus Monticulipora, p. 91.
1882. Fistulipora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 156.
1884. Fistulipora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, p. 43.
1885. Fistulipora. Nicholson and Foord, Ann. Mag. Nat. Hist., ser. 5, XVI, p. 500.
1886. Fistulipora. Waagen and Wentzel, Pal. Indica, Ser. XIII, pp. 909, 922.
1887. Fistulipora. Hall and Simpson, Pal. New York, VI, p. xviii.
1888. Fistulipora (in part). James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 32.
1889. Fistulipora. Miller, North American Geol. Pal., p. 305.
1890. Fistulipora. Ulrich, Geol. Surv. Illinois, VIII, pp. 382, 474.
1896. Fistulipora. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 119.
1896. Fistulipora. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 269; p. 105 (not Ulrich).
1897. Fistulipora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 559.
1882. Didymopora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 156.
1885. Dybowskia. Waagen and Pichl, Pal. Indica, Ser. XIII, p. 717.
1886. Dybowskiella. Waagen and Wentzel, Pal. Indica, Ser. XIII, pp. 910, 916.
1887. Lichenalia (not Hall, 1852). Hall and Simpson, Pal. New York, VI, p. xvi.
1887. Lichenalia (not Hall, 1852). Foerste, Bull. Sci. Lab. Denison Univ., II, p. 168.
1889. Lichenalia (not Hall, 1852). Miller, North American Geol. Pal., p. 311.
1897. Lichenalia (not Hall, 1852). Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 559.
1899. Lichenalia (not Hall, 1852). Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 171.
1897. Fistuliporella. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 560.

Fistulipora acervulosa Rominger.

1866. Fistulipora acervulosa. Rominger, Proc. Acad. Nat. Sci. Philadelphia, p. 120.

Hamilton: Alpena, Michigan.

Fistulipora alternata (Hall).

1883. Lichenalia alternata. Hall, Trans. Albany Institute, X, p. 150 (abstract, 1881, p. 8).
1886. Lichenalia alternata. Hall, Rep. State Geologist New York for the year 1885, pl. xxxi, 39–41.
1887. Lichenalia alternata. Hall and Simpson, Pal. New York, VI, p. 80, pl. xxxi, 39–41.
Hamilton: Falls of the Ohio.

Fistulipora asteria (Prout).

1859. Coscinium asterias. Prout, Trans. St. Louis Acad. Sci., I, p. 574.
1866. Coscinium asterias. Prout, Geol. Surv. Illinois, II, p. 416, pl. xxii, 7, *7a*.
Keokuk: Near Warsaw, Illinois.

Fistulipora astrica Ulrich.

1890. Fistulipora astrica. Ulrich, Geol. Surv. Illinois, VIII, p. 477, fig. *8a* (p. 320), pl. xlvii, 5–*5b*, pl. xlviii, 3.
1889. Fistulipora astricta (in error for astrica), Ulrich (in press). Miller, North American Geol. Pal., fig. 476 (p. 305).
1896. Fistulipora astrica. Ulrich, Zittel's Textb. Pal. (Engl. ed.), fig. 442 (p. 269).
Hamilton: Buffalo, Iowa.

Fistulipora astricta (Ulrich) Miller. See Fistulipora astrica Ulrich.

Fistulipora ? bullata (Hall and Simpson).

1887. Lichenalia bullata. Hall and Simpson, Pal. New York, VI, p. 205, pl. lvii, 12, 13.
Hamilton: Near Le Roy, New York.
Obs. This form may be a Pinacotrypa.

Fistulipora Canadensis Billings. Coral belonging to the genus Favosites.

Fistulipora carbonaria Ulrich.

1884. Fistulipora carbonaria. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, p. 45, pl. iii, 1, *1a*.
1894. Fistulipora carbonaria. Keyes, Missouri Geol. Surv., V, p. 16.
Upper Coal Measures: Kansas City, Missouri; Manhattan, Kansas.

Fistulipora ? clausa Ulrich. See Meekopora clausa (Ulrich).

Fistulipora colliculata (Hall).

1883. Lichenalia colliculata. Hall, Trans. Albany Institute, X, p. 184 (abstract, 1881, p. 184).
1884. Lichenalia colliculata. Hall, Rep. State Geologist New York for the year 1883, p. 36.
1887. Lichenalia colliculata. Hall and Simpson, Pal. New York, VI, p. 200.
1897. Lichenalia colliculata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxii, 8, 9.
Hamilton: York, New York.

Fistulipora collina Ulrich. See Cyclotrypa collina (Ulrich).
Fistulipora communis Ulrich. See Cyclotrypa communis (Ulrich).

Fistulipora compressa Rominger.

1866. Fistulipora compressa. Rominger, Proc. Acad. Nat. Sci. Philadelphia, p. 123.
1894. Fistulipora compressa. Keyes, Missouri Geol. Surv., V, p. 16.
Keokuk: Lagrange, Missouri.

Fistulipora confertipora Hall and Simpson. See **Lioclema confertiporum** (Hall).

Fistulipora ? confusa (Hall and Simpson).

1887. Lichenalia confusa. Hall and Simpson, Pal. New York, VI, p. 204.
Hamilton: Near Le Roy, New York.

Fistulipora ? constricta (Hall).

1883. Lichenalia constricta. Hall, Trans. Albany Institute, X, p. 183 (abstract, 1881, p. 183).
1884. Lichenalia constricta. Hall, Rep. State Geologist New York for the year 1883, p. 36.
1887. Fistulipora constricta. Hall and Simpson, Pal. New York, VI, p. 227.
1888. Fistulipora constricta. Hall, Seventh Ann. Rep. State Geologist New York for the year 1887, pl. xv, 11, 12; Forty-first Ann. Rep. New York State Mus., pl. xv, 11, 12.
1897. Fistuliporella constricta. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxii, 5–7.
Hamilton: Near Le Roy and York, New York.
Obs.—This species is the type of Simpson's Fistuliporella. This genus, in the present state of our knowledge, is a synonym of Fistulipora. However, when this species is better known, the genus Fistuliporella may stand.

Fistulipora conulata (Hall).

1883. Lichenalia conulata. Hall, Trans. Albany Institute, X, p. 151 (abstract, 1881, p. 9).
1886. Lichenalia conulata. Hall, Rep. State Geologist New York for the year 1885, pl. xxxi, 10–14.
1887. Lichenalia conulata. Hall and Simpson, Pal. New York, VI, p. 81, pl. xxxi, 10–14.
Hamilton: Falls of the Ohio.

Fistulipora cornuta (Hall and Simpson).

1887. Lichenalia cornuta. Hall and Simpson, Pal. New York, VI, p. 203.
1888. Lichenalia cornuta. Hall, Seventh Ann. Rep. State Geologist New York for the year 1887, pl. xv, 6; Forty-first Ann. Rep. New York State Mus., pl. xv, 6.
Hamilton: Near York and near Le Roy, New York.

Fistulipora (? Dichotrypa) corrugata Ulrich.

1890. Fistulipora (? Dichotrypa) corrugata. Ulrich, Geol. Surv. Illinois, VIII, p. 480, pl. xlvii, 8, *8a*, pl. xlviii, 6–*6b*.
Hamilton: Thunder Bay, Michigan.

Fistulipora ? crassa (Hall).

1879. Trematopora crassa. Hall, Thirty-second Ann. Rep. New York State Mus., p. 152 (reprint, 1880, p. 14).
1883. Trematopora crassa. Hall, Rep. State Geologist New York for the year 1882, pl. xi, 21, 22.
1887. Lichenalia crassa. Hall and Simpson, Pal. New York, VI, p. 30, pl. xi, 21, 22.
Lower Helderberg: Schoharie, New York.

Fistulipora crassa Rominger (not Hall nor Lonsdale). See **Fistulipora romingeri** Nicholson and Foord.

Fistulipora confertipora Hall and Simpson. See **Lioclema confertiporum** (Hall).

Fistulipora cultellata (Hall).

1884. Lichenalia cultellata. Hall, Rep. State Geologist New York for the year 1883, p. 35.

1887. Lichenalia cultellata. Hall and Simpson, Pal. New York, VI, p. 202, pl. lxiv, 1, 2.

Hamilton: Fall Brook and York, New York.

Fistulipora decipiens Hall and Simpson. See Lioclema decipiens (Hall).

Fistulipora densa Hall and Simpson. See Lioclema densum (Hall).

Fistulipora digitata Hall and Simpson. See Lioclema digitatum (Hall).

Fistulipora distans (Hall).

1879. Lichenalia distans. Hall, Thirty-second Ann. Rep. New York State Mus., p. 157 (reprint, 1880, p. 19).

1883. Lichenalia distans. Hall, Rep. State Geologist New York for the year 1882, pl. xv, 8, 9.

1887. Lichenalia distans. Hall and Simpson, Pal. New York, VI, p. 32, pl. xv, 8, 9.

Lower Helderberg: Schoharie, New York.

Fistulipora distensa (Hall).

1887. Lichenalia distans. Hall and Simpson, Pal. New York, VI, p. 197.

1888. Lichenalia distensa. Hall, Seventh Ann. Rep. State Geologist New York for the year 1887, pl. xv, 5; Forty-first Ann. Rep. New York State Mus., pl. xv, 5.

Hamilton: Western New York.

Fistulipora elegans Rominger. See Pinacotrypa elegans (Rominger).

Fistulipora eriensis Rominger.

1866. Fistulipora Eriensis. Rominger, Proc. Acad. Nat. Sci. Philadelphia, p. 121.

1885. Fistulipora eriensis. Nicholson and Foord, Ann. Mag. Nat. Hist., ser. 5, XVI, p. 511, pl. xvii, 4, 4*a*.

Hamilton: Hamburg, New York.

Fistulipora excellens Ulrich.

1884. Fistulipora excelens. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, p. 46, pl. iii, 3-3*b*.

Chester: Sloans Valley and Litchfield, Kentucky.

Fistulipora flabellata Ulrich. See Chiloporella nicholsoni (James).

Fistulipora flabellum Rominger. See Dichotrypa flabellum (Rominger).

Fistulipora foliacea (Hall).

1883. Lichenalia foliacea. Hall, Trans. Albany Institute, X, p. 183 (abstract, 1881, p. 183).

1884. Lichenalia foliacea. Hall, Rep. State Geologist New York for the year 1883, p. 35.

1887. Ceramopora? (Lichenalia) foliacea. Hall and Simpson, Pal. New York, VI, p. 235, pl. lviii, 6, 7.

Hamilton: West Bloomfield, New York.

Fistulipora foordi Ulrich.

1890. Fistulipora foordi. Ulrich, Geol. Surv. Illinois, VIII, p. 479, fig. 5*f* (p. 315), pl. xlvii, 7, 7*a*, pl. xlviii, 4, 4*a*.

1889. Fistulipora foordi. (Ulrich in press), Miller, North American Geol. Pal., fig. 477 (p. 305).

Hamilton: Rockford, Iowa.

Fistulipora geometrica (Hall).

1886. Lichenalia geometrica. Hall, Rep. State Geologist New York for the year 1885, pl. xxxii, 21-23.
1887. Lichenalia geometrica. Hall and Simpson, Pal. New York, VI, p. 79, pl. xxxii, 21-23.
1897. Pileotrypa geometrica. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxiii, 15.
Hamilton: Falls of the Ohio.
Obs. This form may be the young of Fistulipora normalis (Hall).

Fistulipora granifera (Hall).

1883. Lichenalia granifera. Hall, Trans. Albany Institute, X, p. 153 (abstract, 1881, p. 11).
1886. Lichenalia (Pileotrypa) granifera. Hall, Rep. State Geologist New York for the year 1885, pl. xxx, 28-31.
1887. Lichenalia (Pileotrypa) granifera. Hall and Simpson, Pal. New York, VI, p. 84, pl. xxx, 28-31.
1897. Pileotrypa granifera. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxiii, 13.
Hamilton: Falls of the Ohio.

Fistulipora halli Rominger.

1866. Fistulipora Halli. Rominger, Proc. Acad. Nat. Sci. Philadelphia, p. 119.
1876. Lichenalia concentrica var. parvula. Hall, Twenty-eighth Ann. Rep. New York State Mus. (documentary edition), pl. vii, 1, 2; ibid. (Museum edition, 1879), p. 117, pl. vii, 1, 2.
1882. Lichenalia concentrica var. parvula. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 241, pl. vi. 1, 2.
Niagara: Waldron, Indiana.

Fistulipora ?? helios Rominger.

1866. Fistulipora helios. Rominger, Proc. Acad. Nat. Sci. Philadelphia, p. 120.
Upper Helderberg: From the drift of Michigan.
Obs. Compare with Botryllopora socialis Nicholson, with which this form is perhaps identical.

Fistulipora hemispherica (Roemer).

1860. Thecostegites hemisphericus. Roemer, Sil. Fauna West. Tennessee, p. 25, pl. ii, 3, 3*a*.
1889. Thecostegites hemisphericus. Miller, North American Geol. Pal., fig. 228 (p. 207).
Niagara: Perry and Wayne counties, Tennessee.

Fistulipora ? hemispherica (Hall).

1883. Callopora hemispherica. Hall, Trans. Albany Institute, X, p. 183 (abstract, 1881, p. 183).
1884. Callopora hemispherica. Hall, Rep. State Geologist New York for the year 1883, p. 17.
1887. Fistulipora hemispherica. Hall and Simpson, Pal. New York, VI, p. 226, pl. lvii, 8-11.
Hamilton: York, New York.
Obs. This species will probably be found to belong to another genus (Pinacotrypa ?), and hence will not need renaming.

Fistulipora huronensis (Nicholson).

1875. Ceramopora Huronensis. Nicholson, Geol. Mag., new ser., II, p. 37, pl. ii, 5, 5*a*.

Fistulipora huronensis (Nicholson)—Continued.

1875. Ceramopora Huronensis. Nicholson, Pal. Province Ontario, p. 78, pl. ii, 5, *5a*.
1891. Ceramopora Huronensis. Whiteaves, Contr. Canadian Pal., I, p. 214.
Hamilton: Arkona, Ontario; Hay River, Canada (Whiteaves).
Obs. Lichenalia (Ceramopora) clypeiformis Hall may be a synonym of this species.

Fistulipora incrassata (Nicholson).

1874. Callopora incrassata. Nicholson, Geol. Mag., new ser., I, p. 13, pl. ii, 1.
1874. Callopora incrassata. Nicholson, Pal. Province Ontario, p. 61, fig. *19a–d*.
1879. Fistulipora incrassata. Nicholson, Pal. Tabulate Corals, p. 308, fig. 40, pl. xv, 3–*3b*.
Hamilton: Widder and Arkona, Ontario.

Fistulipora interaspera Hall and Simpson.

1887. Fistulipora interaspera. Hall and Simpson, Pal. New York, VI, p. 218.
1897. Lichenalia interaspera. Simpson, Fourteenth Ann. Rep. State Geologist New York, for the year 1894, pl. xxii, 10.
Hamilton: Lake Canandaigua, New York.

Fistulipora intercellata Hall and Simpson. See Lioclema intercellatum (Hall).

Fistulipora involvens Hall and Simpson. See Lioclema involvens (Hall and Simpson).

Fistulipora labiosa Winchell.

1866. Fistulipora labiosa. Winchell, Rep. Lower Penin. Michigan, p. 88.
Hamilton: Petoskey, Michigan.

Fistulipora ? lamellata (Hall).

1883. Thallostigma lamellata. Hall, Trans. Albany Institute, X, p. 155 (abstract, 1881, p. 13).
1886. Fistulipora lamellata. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxx, 21–23.
1887. Fistulipora lamellata. Hall and Simpson, Pal. New York, VI, p. 87, pl. xxx, 21–23.
Upper Helderberg: Onondaga Valley, New York.

Fistulipora ? laxata Ulrich. See Bythotrypa laxata (Ulrich).

Fistulipora lens Whitfield. See Calloporella ? lens (Whitfield).

Fistulipora longimacula (Hall).

1883. Thallostigma longimacula. Hall, Trans. Albany Institute, X, p. 185 (abstract, 1881, p. 185).
1884. Thallostigma longimacula. Hall, Rep. State Geologist New York for the year 1883, p. 23.
1887. Fistulipora longimacula. Hall and Simpson, Pal. New York, VI, p. 209.
Hamilton: York, New York.
Obs. This may be the same as Fistulipora sulcata Rominger.

Fistulipora lunata Rominger. See Buskopora lunata (Rominger).

Fistulipora maculosa (Hall).

1874. Trematopora maculosa. Hall, Twenty-sixth Ann. Rep. New York State Mus., p. 106.
1879. Callopora maculosa. Hall, Thirty-second Ann. Rep. New York State Mus., p. 156 (reprint, 1880, p. 18).

Fistulipora maculosa (Hall)—Continued.

1883. Callopora maculosa. Hall, Rep. State Geologist New York for the year 1882, pl. xiv, 1-8.

1887. Lichenalia maculosa. Hall and Simpson, Pal. New York, VI, p. 30, pl. xiv, 1-8.

1874. Trematopora ponderosa. Hall, Twenty-sixth Ann. Rep. New York State Mus., p. 106.

Lower Helderberg: Catskill Creek and Clarksville, New York.

Fistulipora micropora Hall and Simpson. See Lioclema microporum (Hall).

Fistulipora minuta Rominger. See Lioclema minutum (Rominger).

Fistulipora monticulata Ulrich.

1890. Fistulipora monticulata. Ulrich, Geol. Surv. Illinois, VIII, p. 477, pl. xlvii, 3-3*b*, pl. xlviii, 2, 2*a*.

Hamilton: Buffalo, Iowa.

Fistulipora multaculeata Hall and Simpson. See Lioclema multaculeatum (Hall).

Fistulipora ? multipora James. See Chiloporella nicholsoni (James).

Fistulipora neglecta Rominger.

1866. Fistulipora neglecta. Rominger, Proc. Acad. Nat. Sci. Philadelphia, p. 119.

1876. Lichenalia concentrica. Hall, Twenty-eighth Ann. Rep. New York State Mus. (documentary edition), pl. v, 9-16, pl. vi, 1, 2, 4, 7-10, pl. vii, 3-11; ibid. (Museum edition, 1879), p. 116, pl. v, 9-16, pl. vi, 1, 2, 4, 7-10, pl. vii, 3-11.

1881. Lichenalia concentrica. Quenstedt, Roehren- und Sternkorallen, p. 95, pl. cxlvi, 71, 72.

1882. Lichenalia concentrica. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 240, pl. iv, 9-16, pl. v, 1, 2, 4, 7-10, pl. vi, 3-11.

1884. Lichenalia concentrica. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, pl. iii, 5.

1887. Lichenalia concentrica. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 168, pl. xvii, 10.

Niagara: Waldron, Indiana.

Fistulipora neglecta-maculata (Hall).

1876. Lichenalia concentrica var. maculata. Hall, Twenty-eighth Ann. Rep. New York State Mus. (documentary edition), pl. vi, 3, 5, 6; ibid. (Museum edition, 1879), p. 117, pl. vi, 3, 5, 6.

1882. Lichenalia concentrica var. maculata. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 241, pl. v, 3, 5, 6.

Niagara: Waldron, Indiana.

Fistulipora nodulifera Meek.

1872. Fistulipora nodulifera. Meek, Pal. Eastern Nebraska, p. 143, pl. v, 5*a*-*d*.

1894. Fistulipora nodulifera. Keyes, Missouri Geol. Surv., V, pl. xxxiv, 3.

1896. Fistulipora nodulifera. Smith, Proc. American Phil. Soc., XXXV, p. 235.

Coal Measures: Nebraska City and other localities in Nebraska; Poteau Mountain, Indian Territory (Smith).

Fistulipora normalis Ulrich.

1886. Fistulipora normalis. Ulrich, Contr. American Pal., I, p. 20, pl. ii, 4-4*b*.

Hamilton: Falls of the Ohio.

Obs. See also Fistulipora geometrica (Hall) and Fistulipora **subestellata** (Hall).

Fistulipora occidens Hall and Whitfield. See Lioclema occidens (Hall and Whitfield).

Fistulipora operculata Simpson. See Pinacotrypa operculata (Hall and Simpson).

Fistulipora ovata (Hall).

1886. Lichenalia ovata. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxxii, 1–5.
1887. Lichenalia ovata. Hall and Simpson, Pal. New York, VI, p. 80, pl. xxxii, 1–5.
1897. Lichenalia ovata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxiii, 2.
Hamilton: Falls of the Ohio.
Obs. See also Fistulipora substellata (Hall).

Fistulipora oweni James. See Cœloclema oweni (James).

Fistulipora parasitica Hall and Simpson. See Lioclema parasiticum (Hall).

Fistulipora peculiaris Rominger. See Actinotrypa peculiaris (Rominger).

Fistulipora ? permarginata (Hall).

1883. Lichenalia permarginata. Hall, Trans. Albany Institute, X, p. 151 (abstract, 1881, p. 10).
1883. Lichenalia permarginata. Hall, Rep. State Geologist New York for the year 1882, pl. (26) xxiv, 20.
1887. Lichenalia permarginata. Hall and Simpson, Pal. New York, VI, p. 82, pl. xxvi, 20.
Upper Helderberg: Onondaga Valley, New York.

Fistulipora plana Hall and Simpson. See Pinacotrypa plana (Hall).

Fistulipora ponderosa Hall and Simpson. See Lioclema ponderosum (Hall).

Fistulipora prolifica Ulrich.

1884. Fistulipora prolifica. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, p. 45, pl. iii, 2, 2*a*.
St. Louis: Colesburg, Kentucky.

Fistulipora proporoides Nicholson. See Pinacotrypa elegans (Rominger).

Fistulipora ? pustulosa (Hall and Simpson).

1887. Lichenalia pustulosa. Hall and Simpson, Pal. New York, VI, p. 206.
1897. Fistulipora pustulosa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxii, 12.
Hamilton: York, New York.
Obs. This form may be a Pinacotrypa.

Fistulipora ramosa (Hall and Simpson).

1887. Lichenalia ramosa. Hall and Simpson, Pal. New York, VI, p. 199.
1898. Lichenalia ramosa. Whiteaves, Contr. Canadian Pal., I, p. 381.
Hamilton: West Williams, Ontario.

Fistulipora romingeri Nicholson and Foord.

1866. Fistulipora crassa. Rominger, Proc. Acad. Nat. Sci. Philadelphia, p. 121.

Fistulipora romingeri Nicholson and Foord—Continued.

1885. Fistulipora Romingeri. Nicholson and Foord, Ann. Mag. Nat. Hist., ser. 5, XVI, p. 506. (Proposed for F. crassa Rominger, the name crassa having been previously used by Lonsdale for a species of this genus.)

1898. Fistulipora Romingeri. Whiteaves, Contr. Canadian Pal., I, p. 380.

Hamilton: Widder, Ontario; Buffalo, Iowa.

Fistulipora rugosa Whitfield. See Batostoma? rugosum (Whitfield).

Fistulipora saffordi Winchell.

1866. Fistulipora Saffordi. Winchell, Rep. Lower Penin. Michigan, p. 88.

Hamilton: Petoskey, Michigan.

Fistulipora ? scrobiculata (Hall).

1883. Thallostigma scrobiculata. Hall, Trans. Albany Institute, X, p. 185 (abstract, 1881, p. 185).

1884. Thallostigma scrobiculata. Hall, Rep. State Geologist New York for the year 1883, p. 20.

1887. Fistulipora scrobiculata. Hall and Simpson, Pal. New York, VI, p. 212, pl. lviii, 17, 18.

1899. Fistuliporina scrobiculata. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 168, fig. 61.

Hamilton: Eighteen-Mile Creek, Erie County and Bellona, Yates County, New York.

Obs. This form may be a Pinacotrypa.

Fistulipora segregata Hall and Simpson. See Lioclema segregatum (Hall).

Fistulipora serialis (Hall and Simpson).

1879. Lichenalia torta (in part). Hall, Thirty-second Ann. Rep. New York State Mus., p. 157 (reprint, 1880, p. 19).

1883. Lichenalia torta. Hall, Rep. State Geologist New York for the year 1882, pl. xv, 6.

1883. Lichenalia tortuosa. Hall, Rep. State Geologist New York for the year 1882, pl. xiii, 17, 18.

1887. Lichenalia serialis. Hall and Simpson, Pal. New York, VI, p. 32, pl. xiii, 17, 18, pl. xv, 6.

Lower Helderberg: Clarksville, New York.

Fistulipora serrulata Hall and Simpson. See Pinacotrypa serrulata (Hall).

Fistulipora siluriana James. See Chiloporella nicholsoni (James).

Fistulipora solidissima Whitfield. See Lioclemella solidissima (Whitfield).

Fistulipora spergenensis Rominger.

1866. Fistulipora Spergenensis. Rominger, Proc. Acad. Nat. Sci. Philadelphia, p. 122.

Warsaw: Spergen Hill, Indiana.

Fistulipora spheroidea Hall and Simpson. See Lioclema spheroideum (Hall).

Fistulipora spinulifera Rominger.

1866. Fistulipora spinulifera. Rominger, Proc. Acad. Nat. Sci. Philadelphia, p. 121.

1890. Fistulipora spinulifera. Ulrich, Geol. Surv. Illinois, VIII, p. 480, pl. xlvi, 3–3*d*.

Hamilton: Alpena, Michigan.

Fistulipora stellifera Rominger. See Meekopora stellifera (Rominger).

Fistulipora subcava (Hall).

1883. Lichenalia subcava. Hall, Trans. Albany Institute, X, p. 150 (abstract, 1881, p. 8).
1883. Lichenalia subcava. Hall, Rep. State Geologist New York for the year 1882, pl. (26) xxiv, 23–25.
1887. Lichenalia subcava. Hall and Simpson, Pal. New York, VI, p. 81, pl. xxvi, 23–25.
Hamilton: Falls of the Ohio.

Fistulipora substellata (Hall).

1883. Lichenalia substellata. Hall, Trans. Albany Institute, X, p. 149 (abstract, 1881, p. 7).
1883. Lichenalia substellata. Hall, Rep. State Geologist New York for the year 1882, pl. (26) xxiv, 26.
1886. Lichenalia substellata. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxx, 1–11.
1887. Lichenalia substellata. Hall and Simpson, Pal. New York, VI, p. 78, pl. xxvi, 26, pl. xxx, 1–11.
1897. Lichenalia substellata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxiii, 1.
Hamilton: Falls of the Ohio.
Obs. Fistulipora normalis Ulrich and Fistulipora ovata (Hall) may be synonyms of this species.

Fistulipora ? subtilis Hall and Simpson. See Lioclema subtile (Hall).

Fistulipora subtrigona (Hall and Simpson).

1887. Lichenalia subtrigona. Hall and Simpson, Pal. New York, VI, p. 196.
1888. Lichenalia subtrigona. Hall, Seventh Ann. Rep. State Geologist New York for the year 1887, pl. xv, 3, 4; Forty-first Ann. Rep. New York State Mus., pl. xv, 3, 4.
1897. Lichenalia subtrigona. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxiii, 4.
1898. Lichenalia subtrigona. Whiteaves, Contr. Canadian Pal., I, p. 381.
Hamilton: West Williams, Ontario.

Fistulipora sulcata Rominger.

1866. Fistulipora sulcatus. Rominger, Proc. Acad. Nat. Sci. Philadelphia, p. 120.
Hamilton: Near Alpena, Michigan.
Obs. See also Fistulipora longimacula (Hall).

Fistulipora torta (Hall).

1879. Lichenalia torta. Hall, Thirty-second Ann. Rep. New York State Mus., p. 157 (reprint, 1880, p. 19).
1883. Lichenalia torta. Hall, Rep. State Geologist New York for the year 1882, pl. xv, 1–5, 7.
1887. Lichenalia torta. Hall and Simpson, Pal. New York, VI, p. 31, pl. xv, 1–5, 7.
Lower Helderberg: Clarksville and Schoharie, New York.

Fistulipora ? triangularis (Hall).

1883. Thallostigma triangularis. Hall, Trans. Albany Institute, X, p. 187 (abstract, 1881, p. 187).
1884. Thallostigma triangularis. Hall, Rep. State Geologist New York for the year 1883, p. 32.

Fistulipora ? triangularis (Hall)—Continued.

1887. Fistulipora triangularis. Hall and Simpson, Pal. New York, VI, p. 222.
Hamilton: Western New York.

Fistulipora ? trifaria Hall and Simpson.

1887. Fistulipora trifaria. Hall and Simpson, Pal. New York, VI, p. 222.
Hamilton: Fall brook, New York.

Fistulipora trifolia Rominger. See Phractopora trifolia (Rominger).

Fistulipora ? triloba Hall and Simpson.

1887. Fistulipora triloba. Hall and Simpson, Pal. New York, VI, p. 29.
1888. Fistulipora triloba. Hall, Seventh Ann. Rep. State Geologist New York for the year 1887, pl. xv, 1, 2; Forty-first Ann. Rep. New York State Mus., pl. xv, 1, 2.
1897. Fistulipora triloba. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxii, 11.
Lower Helderberg: Near Schoharie, New York.

Fistulipora ? tuberculata (Prout).

1859. Coscinium tuberculatum. Prout, Trans. St. Louis Acad. Sci., I, p. 573.
1866. Coscinium tuberculatum. Prout, Geol. Surv. Illinois, II, p. 415, pl. xxii, 6.
Keokuk: Near Warsaw, Illinois.

Fistulipora ? umbilicata (Hall).

1883. Thallostigma umbilicata. Hall, Trans. Albany Institute, X, p. 185 (abstract, 1881, p. 185).
1884. Thallostigma umbilicata. Hall, Rep. State Geologist New York for the year 1883, p. 22.
1887. Fistulipora umbilicata. Hall and Simpson, Pal. New York, VI, p. 213.
Hamilton: York, New York.
Obs. This may prove to be a species of Pinacotrypa.

Fistulipora ? unilinea Hall and Simpson.

1887. Fistulipora unilinea. Hall and Simpson, Pal. New York, VI, p. 217, pl. lvii, 1, 2, 5.
Hamilton: York, New York.
Obs. This may prove to be a species of Pinacotrypa.

Fistulipora utriculus Rominger.

1866. Fistulipora utriculus. Rominger, Proc. Acad. Nat. Sci. Philadelphia, p. 121.
1885. Fistulipora utriculus. Nicholson and Foord, Ann. Mag. Nat. Hist., ser. 5, XVI, p. 508, pl. xvi, 1–1*e*, pl. xvii, 1, 1*a*.
1898. Fistulipora utriculus. Whiteaves, Contr. Canadian Pal., I, p. 380.
Hamilton: Widder and Arkona, Ontario.

Fistulipora variapora Hall. See Pinacotrypa variapora (Hall).

Fistulipora vesiculata (Hall and Simpson).

1887. Lichenalia vesiculata. Hall and Simpson, Pal. New York, VI, p. 198, pl. lvii, 14–19, pl. lix, 1, 14.
1897. Lichenalia vesiculata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxiii, 3.
Hamilton: Canandaigua Lake, York and near Le Roy, New York.

Fistuliporella Simpson. See Fistulipora McCoy, and observation on Fistulipora ? constricta (Hall).

Fistuliporella constricta Simpson. See Fistulipora ? constricta (Hall).

Fistuliporidra Simpson. See Favicella Hall and Simpson.

Fistuliporidra tessellata Simpson. See Favicella tessellata (Hall and Simpson).

Fistuliporina Simpson. See Pinacotrypa Ulrich.

Fistuliporina confertipora Simpson. See Lioclema confertiporum (Hall).

Fistuliporina digitata Simpson. See Lioclema digitatum (Hall).

Fistuliporina micropora Simpson. See Lioclema microporum (Hall).

Fistuliporina minuta Grabau. See Lioclema minutum (Rominger).

Fistuliporina multiculeata Simpson. See Lioclema multaculeatum (Hall).

Fistuliporina ponderosa Simpson. See Lioclema ponderosum (Hall).

Fistuliporina scrobiculata Grabau. See Fistulipora ? scrobiculata (Hall).

Fistuliporina segregata Grabau. See Lioclema segregatum (Hall).

Fistuliporina serrulata Simpson. See Pinacotrypa serrulata (Hall).

Fistuliporina stellata Simpson. See Pinacotrypa stellata (Hall).

Fistuliporina variopora Simpson. See Pinacotrypa variapora (Hall).

Flabelliporella Simpson. See Polypora McCoy.

Flabelliporina Simpson. See Fenestella Lonsdale.

Flustra Linnæus. Not Paleozoic.

Flustra carbaseoides Eaton. Not recognized.

1832. Flustra carbaseoides. Eaton, Geol. Textb., ed. 2, p. 44.
Devonian: Glenns Falls.

Flustra spatulata Prout. See Worthenopora spatulata (Prout).

Flustra tuberculata Prout. See Stenopora tuberculata (Prout).

Geinitzella Waagen and Wentzel. See Batostomella Ulrich.

Glauconome of authors. See Pinnatopora Vine.

Glauconome carinata Hall. See Pinnatopora carinata (Hall).

Glauconome nereidis White. See Pinnatopora nereidis (White).

Glauconome nodata Hall. See Pinnatopora nodata (Hall).

Glauconome sinuosa Hall. See Pinnatopora sinuosa (Hall).

Glauconome tenuistriata Hall. See Pinnatopora tenuistriata (Hall).

Glauconome trilineata Meek. See Pinnatopora trilineata (Meek).

Glauconome whitii Foerste. See Pinnatopora whitii (Foerste).

GLOSSOTRYPA Hall. Genotype: Lichenalia paliformis Hall.

1886. Glossotrypa. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, expl. pl. xxxi, 15–18.

1887. Glossotrypa. Hall and Simpson, Pal. New York, VI, p. xvii.

1889. Glossotrypa. Miller, North American Geol. Pal., p. 307.

1897. Glossotrypa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 562.

Obs. If the lunarium is frequently repeated (interrupted) as a diaphragm, as described, the genus is distinct. This character is so extraordinary that we think it is due to faulty observation or peculiar preservation. If so, the name is a synonym for Buskopora Ulrich.

Glossotrypa paliformis (Hall).

1883. Lichenalia paliformis. Hall, Trans. Albany Institute, X, p. 152 (abstract, 1881, p. 11).
1886. Lichenalia (Glossotrypa) paliformis. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxxi, 15–18.
1887. Lichenalia (Glossotrypa) paliformis. Hall and Simpson, Pal. New York, VI, p. 85, pl. xxxi, 15–18.
1897. Glossotrypa paliformis. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxiv, 8–10.
Hamilton: Falls of the Ohio.

GLYPTOPORA Ulrich. Genotype: Coscinium plumosum Prout.

1884. Glyptopora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, p. 39.
1890. Glyptopora. Ulrich, Geol. Surv. Illinois, VIII, pp. 387, 511.
1896. Glyptopora. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 280.

Glyptopora elegans (Prout).

1860. Coscinium elegans. Prout, Trans. St. Louis Acad. Sci., I, p. 572.
1866. Coscinium elegans. Prout, Geol. Surv. Illinois, II, p. 413, pl. xxii, 2, 2*a*.
1884. Glyptopora elegans. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, p. 40.
1890. Glyptopora elegans. Geol. Surv. Illinois, VIII, p. 518, pl. lxxviii, 10–10*e*.
1894. Glyptopora elegans. Keyes, Missouri Geol. Surv., V, p. 21.
Warsaw: Warsaw and Nauvoo, Illinois; Curryville, Missouri.

Glyptopora keyserlingi (Prout).

1858. Coscinium Keyserlingi. Prout, Trans. St. Louis Acad. Sci., I, p. 269, pl. xv, 4, 4*a*.
1884. Glyptopora keyserlingi. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, p. 40.
1890. Glyptopora keyserlingi. Ulrich, Geol. Surv. Illinois, VIII, p. 517, pl. lxxviii, 4–4*b*.
1894. Glyptopora keyserlingi. Keyes, Missouri Geol. Surv., V, p. 22.
1860. Coscinium wortheni. Prout, Trans. St. Louis Acad. Sci., I, p. 571.
1866. Coscinium wortheni. Prout, Geol. Surv. Illinois, II, p. 412, pl. xxii, 1, 1*a*.
Keokuk: Warsaw, Illinois.

Glyptopora megastoma Ulrich. See Phractopora megastoma (Ulrich).

Glyptopora michelinia (Prout).

1860. Coscinium Michelinia. Prout, Trans. St. Louis Acad. Sci., I, p. 573.
1866. Coscinium Michelinia. Prout, Geol. Surv. Illinois, II, p. 414, pl. xxii, 4, 4*a*.
1884. Glyptopora michelinia. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, p. 40.
1890. Glyptopora michelinia. Ulrich, Geol. Surv. Illinois, VIII, p. 515, pl. lxxviii, 8–8*b*.
1894. Glyptopora michelinia. Keyes, Missouri Geol. Surv., V, p. 22.
1897. Phractopora sagenella (not of Prout). Simpson, Fourteenth Ann. Rep. State Geologist, New York, for the year 1894, fig. 95 (p. 539).
Warsaw: Warsaw, Illinois; Barretts Station, Missouri.

Glyptopora pinnata Ulrich. See Phractopora pinnata (Ulrich).

Glyptopora plumosa (Prout).

1860. Coscinium plumosum. Prout, Trans. St. Louis Acad. Sci., I, p. 572.
1866. Coscinium plumosum. Prout, Geol. Surv. Illinois, II, p. 414, pl. xxii, 3, 3*b*.
1884. Glyptopora plumosa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, p. 40.

Glyptopora plumosa (Prout)—Continued.

1890. Glyptopora plumosa. Ulrich, Geol. Surv. Illinois, VIII, p. 512, pl. lxxviii, 3-3*c*.
1894. Glyptopora plumosa. Keyes, Missouri Geol. Surv., V, p. 20, pl. xxxiii, 5.
Warsaw: Warsaw, Illinois; Barretts Station, Missouri.

Glyptopora punctipora Ulrich.

1890. Glyptopora punctipora. Ulrich, Geol. Surv. Illinois, VIII, p. 519, pl. lxxviii, 9, 9*a*.
Chester: Monroe County, Illinois; Livingston and Meade counties, Kentucky.

Glyptopora sagenella (Prout).

1860. Coscinium saganella. Prout, Trans. St. Louis Acad. Sci., I, p. 573.
1866. Coscinium saganella. Prout, Geol. Surv. Illinois, II, p. 415, pl. xxii, 5, 5*a*.
1884. Glyptopora sagenella. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, p. 40.
1890. Glyptopora sagenella. Ulrich, Geol. Surv. Illinois, VIII, p. 513, pl. lxxviii, 6, 6*a*.
1894. Glyptopora sagenella. Keyes, Missouri Geol. Surv., V, p. 21.
Keokuk: Bentonsport, Iowa.
Warsaw: Warsaw, Illinois.

Glyptopora sagenella-caliculosa Ulrich.

1866. Coscinium plumosum (in part). Prout, Geol. Surv. Illinois, II, p. 415, pl. xxii, 3*a*.
1890. Glyptopora sagenella var. caliculosa. Ulrich, Geol. Surv. Illinois, VIII, p. 514.
Warsaw: Warsaw, Illinois.

Glyptopora sagenella-lata Ulrich.

1890. Glyptopora sagenella var. lata. Ulrich, Geol. Surv. Illinois, VIII, p. 515, pl. lxxviii, 7.
1897. Phractopora michelini. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 96 (p. 539).
Warsaw: Warsaw, Illinois.

Glyptotrypa Miller, Simpson. Written in error for Glyptopora Ulrich.

GONIOCLADIA Etheridge, Jun. Genotype: Carinella cellulifera Etheridge, Jun.

1873. Carinella. Etheridge, Jun., Geol. Mag., X, p. 433.
1876. Goniocladia. Etheridge, Jun., Geol. Mag., Dec. 2, III, p. 522.
1885. Goniocladia. Waagen and Pichl, Pal. Indica, Ser. XIII, pp. 775, 804.
1886. Goniocladia. Ulrich, Contr. American Pal., I, p. 5.
Obs.—No American species referable to this genus has been published.

GONIOTRYPA Ulrich. Genotype: Goniotrypa bilateralis Ulrich.

1889. Goniotrypa. Ulrich, Contr. Micro-Pal. Cambro-Sil., Part II, p. 40.
1889. Goniotrypa. Miller, North American Geol. Pal., p. 307.
1890. Goniotrypa. Ulrich, Geol. Surv. Illinois, VIII, p. 389.
1897. Goniotrypa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 545.

Goniotrypa bilateralis Ulrich.

1889. Goniotrypa bilateralis. Ulrich, Contr. Micro-Pal. Cambro-Sil., Part II, p. 41, figs. 1-3, pl. ix, 1.
1889. Goniotrypa bilateralis. Miller, North American Geol. Pal., fig. 481 (p. 307).

Goniotrypa bilateralis Ulrich—Continued.

1895. Goniotrypa bilateralis. Whiteaves, Pal. Foss, III, p. 118.
Cincinnati (Richmond): Stony Mountain, Manitoba.

Gorgonia Linnæus. Not Paleozoic.

Gorgonia anticorum. Castelnau. Not recognized.

1843. Gorgonia anticorum. Castelnau, Syst. Sil., p. 50, pl. xxiv, 1.
Lake Huron.

Gorgonia? aspera Hall. See Phylloporina aspera (Hall).

Gorgonia infundibuliformis Eaton. Not recognized.

1832. Gorgonia infundibuliformis. Eaton, Geol. Text-book, ed. 2, p. 43.

Gorgonia perantiqua Hall. Not recognizable.

1847. Gorgonia perantiqua. Hall, Pal. New York, I, p. 76, pl. xxvi, 5*a*, *b*.
1850. Enallopora perantiqua. D'Orbigny, Prodr. de Pal., I, p. 22.
1889. Enallopora perantiqua. Miller, North American Geol. Pal., p. 301.
Trenton: Middleville, Herkimer County, New York.

Gorgonia retiformis Hall. Not a bryozoan. See Pal. New York, II, 1852, p. 174.

1843. Gorgonia ? retiformis. Hall, Geol. Rep. Fourth District New York, p. 115, fig. 1.

Gorgonia siluriana Castelnau. Not recognized.

1843. Gorgonia siluriana. Castelnau, Syst. Sil., p. 50.

GRAPTODICTYA Ulrich. Genotype: Ptilodictya perelegans Ulrich.

1882. Graptodictya. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, pp. 151, 165.
1889. Graptodictya. Miller, North American Geol. Pal., p. 307.
1890. Graptodictya. Ulrich, Geol. Surv. Illinois, VIII, p. 393.
1897. Graptodictya. Simpson, Fourteenth Ann. Rep. New York State Geologist for the year 1894, p. 541.

Graptodictya nitida Ulrich. See Graptodictya perelegans (Ulrich).

Graptodictya perelegans (Ulrich).

1878. Ptilodictya perelegans. Ulrich, Jour. Cincinnati Soc. Nat. Hist., I, p. 94, pl. iv, 16, 16*a*.
1882. Graptodictya perelegans. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 165.
1882. Graptodictya nitida. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 166, pl. vii, 8, 8*a*.
Cincinnati (Richmond): Clarksville and other localities in Ohio.

HEDERELLA Hall. Genotype: Alecto? Canadensis Nicholson.

1883. Hederella. Hall, Trans. Albany Institute, X, p. 194 (abstract, 1881, p. 194).
1887. Hederella. Hall and Simpson, Pal. New York, VI, p. xxvi.
1889. Hederella. Miller, North American Geol. Pal., p. 308.
1897. Hederella. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 599.
1899. Hederella. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 178.
1885. Nicholsonia. Davis, Kentucky Foss. Corals, part 2. (Name proposed but not defined.)

Hederella adnata (Davis).

1885. Nicholsonia adnata. Davis, Kentucky Foss. Corals, part. 2, pl. lxxviii, 19. (Not described.)
Hamilton: Falls of the Ohio.
Obs.—Compare this form with Hederella filiformis (Billings).

Hederella alternata (Hall and Whitfield).

1873. Stomatopora ? alternata. Hall and Whitfield, Twenty-third Ann. Rep. New York State Museum, p. 235, pl. x, 7, 8.
Hamilton: Rockford and Hackberry, Iowa.
Obs.—Whiteaves (Contr. Canadian Pal., I, p. 210) makes this a synonym for Hederella Canadensis (Nicholson).

Hederella canadensis (Nicholson).

1874. Alecto ? Canadensis. Nicholson, Canadian Naturalist, ser. 2, VII, p. 146.
1874. Aulopora ? Canadensis. Nicholson, Pal. Province Ontario, p. 124, fig. 57*a–e*.
1883. Hederella Canadensis. Hall, Trans. Albany Institute, X, p, 194 (abstract, 1881, p. 194).
1884. Hederella Canadensis. Hall, Rep. State Geologist New York for the year 1883, p. 53.
1885. Nicholsonia canadensis. Davis, Kentucky Foss. Corals, part 2, pl. li, 6, pl. lxxiii, 10, 11, pl. lxxviii, 18, pl. lxxx, 15.
1887. Hederella Canadensis. Hall and Simpson, Pal. New York, VI, p. 277, pl. lxv, 1–8, 14, ? 16.
1889. Hederella canadensis. Miller, North American Geol. Pal., fig. 483 (p.308).
1891. Hederella Canadensis. Whiteaves, Contr. Canadian Pal., I, p. 210, pl. xxviii, 8, 8*a*.
1897. Hederella canadensis. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxv, 12, 13.
1899. Hederella canadensis. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 178, fig. 77.
Upper Helderberg: Port Colborne, Ontario.
Hamilton: Near Arkona, Ontario; Livingston and Erie counties, and Eighteenmile Creek, New York, Falls of the Ohio; Hay River and Athabasca River, Canada.

Hederella cirrhosa Hall.

1883. Hederella cirrhosa. Hall, Trans. Albany Institute, X, p. 194 (abstract, 1881, p. 194).
1884. Hederella cirrhosa. Hall, Rep. State Geologist New York for the year 1883, p. 53.
1887. Hederella cirrhosa. Hall and Simpson, Pal. New York, VI, p. 277, pl. lxv, 12, 13.
1897. Hederella cirrhosa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxv, 10, 11.
1898. Hederella cirrhosa. Whiteaves, Contr. Canad. Pal., I, Part V, p. 381.
Hamilton: York and Erie counties, New York; Falls of the Ohio.

Hederella conferta (Hall).

1883. Ptilionella conferta. Hall, Trans. Albany Institute, X, p. 195 (abstract, 1881, p. 195).
1884. Ptilionella conferta. Hall, Rep. State Geologist New York for the year 1883, p. 56.
1887. Hederella conferta. Hall and Simpson, Pal. New York, VI, p. 279.
1891. Hederella conferta. Hall, Tenth Ann. Rep. State Geologist New York for the year 1890, p. 56; Forty-fourth Ann. Rep. New York State Museum, p. 86.
Hamilton: Darien Center, New York.

Hederella filiformis (Billings).

1859. Aulopora filiformis. Billings, Canadian Jour., new ser., IV, p. 119.
1874. Aulopora filiformis. Nicholson, Pal. Province Ontario, p. 42, fig. 11a, b.

Hederella filiformis (Billings)—Continued.

1883. Hederella filiformis. Hall, Trans. Albany Institute, X, p. 194 (abstract, 1881, p. 194).
1884. Hederella filiformis. Hall, Rep. State Geologist New York for the year 1883, p. 54.
1887. Hederella filiformis. Hall and Simpson, Pal. New York, VI, p. 278, pl. lxv, 9–11.
1897. Hederella filiformis. Whiteaves, Contr. Canadian Pal., I, p. 211, pl. xxix, 1.
1899. Hederella filiformis. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 179, fig. 77A.
Hamilton: Arkona, Ontario; Livingston, Ontario, and Erie counties, New York.

Hederella magna Hall.

1883. Hederella magna. Hall, Trans. Albany Institute, X, p. 195 (abstract, 1881, p. 195).
1884. Hederella magna. Hall, Rep. State Geologist New York for the year 1883, p. 55.
1887. Hederella magna. Hall and Simpson, Pal. New York, VI, p. 280, pl. lxv, 15.
1898. Hederella magna. Whiteaves, Contr. Canadian Pal., I, Part V, p. 382.
Hamilton: York, and Erie County, New York.

HELICOPORA Claypole. Genotype: Helicopora latispiralis Claypole.

1881. Helicopora. Claypole, Proc. American Assoc. Adv. Sci., XXX, p. 191.
1883. Helicopora. Claypole, Quar. Jour. Geol. Soc. London, XXXIX, p. 32.
1885. Helicopora. Waagen and Pichl, Pal. Indica, Ser. XIII, p. 774.
1886. Helicopora. Ulrich, Contr. American Pal., I, p. 5.
1889. Helicopora. Miller, North American Geol. Pal., p. 308.
1890. Helicopora. Ulrich, Geol. Surv. Illinois, VIII, p. 396.
1895. Helicopora. Simpson, Thirteenth Ann. Rep. State Geologist New York for the year 1893, pp. 722, 726; Forty-seventh Ann. Rep. New York State Museum, pp. 916, 920.
1896. Helicopora. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 282.
1897. Helicopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pp. 517, 522.

Helicopora archimediformis Claypole. See Archimedes laxus (Hall).

Helicopora latispiralis Claypole.

1881. Helicopora latispiralis. Claypole, Proc. American Assoc. Adv. Sci., XXX, p. 191.
1883. Helicopora latispiralis. Claypole, Quar. Jour. Geol. Soc. London, XXXIX, p. 32, pl. iv, 1, 1*a*.
1897. Helicopora latispiralis. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 70, 1 (p. 518).
Niagara: Cedarville, Greene County, Ohio.

Helicopora ulrichi Claypole.

1883. Helicopora ulrichi. Claypole, Quar. Jour. Geol. Soc. London, XXXIX, p. 33, pl. iv, 2.
1897. Helicopora ulrichi. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 70, 2, 2*a* (p. 518).
Hamilton: Falls of the Ohio.

HELIOTRYPA Ulrich. Genotype: Heliotrypa bifolia Ulrich.

1883. Heliotrypa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 277.
1889. Heliotrypa. Miller, North American Geol. Pal., p. 308.
1890. Heliotrypa. Ulrich, Geol. Surv. Illinois, VIII, p. 404.

Heliotrypa bifolia Ulrich.

1883. Heliotrypa bifolia. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 278, pl. xiii, 6–6c.
1889. Heliotrypa bifolia. Miller, North American Geol. Pal., fig. 484 (p. 308).
1890. Heliotrypa bifolia. Ulrich, Geol. Surv., Illinois, VIII, fig. 3*f* (p. 308).
Chester: Sloans Valley, Kentucky.

Hellipora antheloidea Rominger. In error for Stellipora antheloidea. See Constellaria constellata (Van Cleve) Dana.

HELOPORA Hall. Genotype: Helopora fragilis Hall.

1852. Helopora. Hall, Pal. New York, II, p. 44.
1866. Helopora. Billings, Catal. Sil. Foss. Anticosti, p. 36.
1888. Helopora. Ulrich, American Geologist, I, p. 231.
1889. Helopora. Miller, North American Geol. Pal., p. 308.
1890. Helopora. Ulrich, Geol. Surv. Illinois, VIII, pp. 401, 642.
1890. Helopora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., XII, p. 191.
1893. Helopora. Ulrich, Geol. Minnesota, III, p. 189.
1896. Helopora. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 280.
1897. Helopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 548.

Helopora alternata Ulrich.

1890. Helopora alternata. Ulrich, Jour. Cincinnati Soc. Nat. Hist., XII, p. 192, fig. 16*f*.
1893. Helopora alternata. Ulrich, Geol. Minnesota, III, p. 192, pl. iii, 9.
Trenton (Black River): Minneapolis, Minnesota.

Helopora approximata James. See Bythopora parvula (James).

Helopora armata Billings.

1866. Helopora armata. Billings, Catal. Sil. Foss. Anticosti, p. 38.
Anticosti: Anticosti Island.

Helopora bellula Billings.

1866. Helopora bellula. Billings, Catal. Sil. Foss. Anticosti, p. 38.
Anticosti: Anticosti Island.
Obs. Compare Helopora fragilis Hall, of which this species may be a synonym.

Helopora ?? circe Billings.

1866. Helopora Circe. Billings, Catal. Sil. Foss. Anticosti, p. 39.
Anticosti: Anticosti Island.

Helopora ?? concava Billings.

1866. Helopora concava. Billings, Catal. Sil. Foss. Anticosti, p. 37.
Anticosti: Anticosti Island.
Obs. This form may be only a condition of Nematopora formosa (Billings).

Helopora dendrina James. See Bythopora dendrina (James).

Helopora divaricata Ulrich.

1886. Helopora divaricata. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Surv. Minnesota, p. 59.
1893. Helopora divaricata. Ulrich, Geol. Minnesota, III, p. 191, pl. iii, 1–3.
Trenton (Stones River): Minneapolis, Minnesota.

Helopora elegans Ulrich.

1893. Helopora elegans. Ulrich, Geol. Minnesota, III, p. 194, fig. 11.
Cincinnati (Richmond): Blanchester, Oxford, and other localities in Ohio, Richmond and Versailles, Indiana.

Helopora formosa Billings. See Nematopora formosa (Billings).

Helopora fragilis Hall.

1852. Helopora fragilis. Hall, Pal. New York, II, p. 44, pl. xviii, 3*a–f*.

1874. Helopora fragilis. Nicholson and Hinde, Canadian Jour., new ser., XIV, p. 141.

1875. Helopora fragilis. Nicholson, Pal. Province Ontario, p. 44, fig. 19, 3, 3*a*.

1888. Helopora fragilis. Ulrich, American Geologist, I, p. 233, fig. 2*a–e*.

1889. Helopora fragilis. Miller, North American Geol. Pal., figs. 485*a–e*, 486 (p. 308).

1890. Helopora fragilis. Ulrich, Geol. Sur. Illinois, VIII, p. 642, figs. 18*a–e* (p. 643), pl. xxix, 5*a*.

Clinton: Rochester, New York.

Niagara: Lockport, New York; Flamborough Head, Ontario.

Obs. See also Helopora bellula Billings.

Helopora fragilis-acadiensis Hall. Not defined.

1860. Helopora fragilis var. acadiensis. Hall, Canadian Nat. Geol., V, p. 159.

Silurian: Nova Scotia.

Helopora harrisi James.

1883. Helopora harrisi. James, Paleontologist, No. 7, p. 58, pl. ii, 2–2*b*.

1889. Helopora harrisi. Ulrich, Contr. Micro-Pal. Cambro-Sil., Part II, p. 45.

1893. Helopora harrisi. Ulrich, Geol. Minnesota, III, p. 195, pl. iii, 11*b*, *c*, 12.

1895. Helopora Harrisii. Whiteaves, Pal. Foss., III, Part II, p. 117.

1897. Helopora Harrisi. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 113–115 (p. 548).

Cincinnati (Richmond): Waynesville, Blanchester, and other localities in Ohio; Stony Mountain, Manitoba.

Helopora imbricata Ulrich.

1890. Helopora imbricata. Ulrich, Geol. Sur. Illinois, VIII, p. 644, pl. xxix, 5.

Cincinnati (Richmond): Wilmington, Illinois.

Obs. This form may be the tertiary segments of Arthroclema angulare Ulrich.

Helopora ?? irregularis Billings.

1866. Helopora irregularis. Billings, Catal. Sil. Foss. Anticosti, p. 39.

Anticosti: Anticosti Island.

Helopora lineata Billings. See Nematopora lineata (Billings).

Helopora lineopora Billings. See Nematopora ? lineopora (Billings).

Helopora ?? meeki James.

1878. Helopora meeki. James, Paleontologist, No. 1, p. 3.

Cincinnati: Warren County, Ohio.

Obs. This is in all probability the same as Dicranopora internodia (Miller and Dyer), but the description given is too meager to determine the question.

Helopora mucronata Ulrich.

1890. Helopora mucronata. Ulrich, Jour. Cincinnati Soc. Nat. Hist., XII, p. 192, fig. 16*e*.

1893. Helopora mucronata. Ulrich, Geol. Minnesota, III, p. 193, pl. iii, 10.

Trenton: Cannon Falls and St. Paul, Minnesota.

Helopora nodosa Billings.

1866. Helopora nodosa. Billings, Catal. Sil. Foss. Anticosti, p. 38.

Anticosti: Anticosti Island.

Helopora parvula James. See Bythopora parvula (James).

Helopora quadrata Ulrich.

1893. Helopora quadrata. Ulrich, Geol. Minnesota, III, p. 193, fig. 10.
Trenton: Cannon Falls, Minnesota.

Helopora spiniformis (Ulrich).

1882. Arthroclema spiniformis. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 161, pl. vi, 10, 10*a*.
1893. Helopora spiniformis. Ulrich, Geol. Minnesota, III, pl. iii, 4, 5, 6.
1896. Helopora spiniformis. Ulrich, Zittel's Textb. Pal. (Engl. ed.), fig. 469 (p. 283).
Trenton (Stones River): Lebanon and Lavergne, Tennessee; Dixon, Illinois.

Helopora striatopora Billings. See Nematopora striatopora (Billings).

Helopora strigosa Billings. See Nematopora strigosa (Billings).

Helopora tenuis James. See Arthrostylus tenuis (James).

Helopora ?? varipora Billings.

1866. Helopora varipora. Billings, Catal. Sil. Foss. Anticosti, p. 40.
Anticosti: Anticosti Island.

HEMIPHRAGMA Ulrich. Genotype: Batostoma irrasum Ulrich.

1890. Batostoma (in part). Ulrich, Geol. Sur. Illinois, VIII, p. 379.
1893. Hemiphragma. Ulrich, Geol. Minnesota, III, p. 299.
1896. Hemiphragma. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 275.
1897. Hemiphragma. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 592.

Hemiphragma imperfectum (Ulrich).

1890. Batostoma imperfectum. Ulrich, Geol. Sur. Illinois, VIII, p. 460, pl. xxxv, 3–3*d*.
1893. Hemiphragma imperfectum. Ulrich, Geol. Minnesota, III, p. 301.
1894. Monticulipora imperfectum. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 196.
Cincinnati (Richmond): Wilmington, Illinois.

Hemiphragma irrasum (Ulrich).

1886. Batostoma irrasa. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Sur. Minnesota, p. 94.
1893. Hemiphragma irrasum. Ulrich, Geol. Minnesota, III, p. 299, pl. xxiv, 5–19.
1896. Hemiphragma irrasum. Ulrich, Zittel's Textb. Pal. (Engl. ed.), fig. 460 (p. 275).
1897. Hemiphragma irrasum. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 190–193 (p. 592).
Trenton (Stones River, Black River, and Trenton): Minneapolis, St. Paul, Cannon Falls, and Preston, Minnesota; Decorah, Iowa.

Hemiphragma ottawense (Foord).

1883. Batostoma Ottawaense. Foord, Contr. Micro-Pal. Cambro-Sil., p. 18, pl. ii, 1–1*f*.
1893. Hemiphragma ottawaense. Ulrich, Geol. Minnesota, III, p. 300, pl. xxiv, 1–4.
Trenton (Black River and Trenton): Ottawa and Paquettes Rapids, Ottawa River, Canada; Kenyon, Berne, and Mantorville, Minnesota.

Hemiphragma tenuimurale Ulrich.

1893. Hemiphragma tenuimurale. Ulrich, Geol. Minnesota, III, p. 301, pl. xxiv, 20–23.
Trenton: Goodhue County, Minnesota.

Hemiphragma whitfieldi (James).

1881. Monticulipora (Chætetes) whitfieldi. James, Paleontologist, No. 5, p. 34.
1888. Monticulipora whitfieldi. James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 178.
1894. Monticulipora whitfieldi. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 200.
Cincinnati (Utica): Cincinnati, Ohio, and vicinity.

HEMITRYPA Phillips. Genotype: Hemitrypa oculata Phillips.

1841. Hemitrypa. Phillips, Pal. Foss., p. 27.
1844. Hemitrypa. McCoy, Synop. Carb. Foss. Ireland, p. 204.
1874. Hemitrypa. Hall, Twenty-sixth Ann. Rep. New York State Mus., p. 97.
1885. Hemitrypa. Hall, Rep. State Geologist New York for the year 1884, p. 36.
1886. Hemitrypa. Ulrich, Contr. American Pal., I, p. 4.
1887. Hemitrypa. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 152.
1887. Hemitrypa. Hall and Simpson, Pal. New York, VI, p. xxiii.
1889. Hemitrypa. Miller, North American Geol. Pal., p. 309.
1890. Hemitrypa. Ulrich, Geol. Sur. Illinois, VIII, pp. 396, 559.
1893. Hemitrypa. Cole, Sci. Proc. Roy. Dublin Soc. (n. s.), VIII, p. 132.
1894. Hemitrypa. Počta, Syst. Sil. Bohême, VIII, t. 1, p. 92.
1895. Hemitrypa. Whidborne, Devon. Fauna England (Pal. Soc. Publ.), II, pt. 4, p. 177.
1895. Hemitrypa. Simpson, Thirteenth Ann. Rep. State Geologist New York for the year 1893, pp. 710, 726; Forty-seventh Ann. Rep. New York State Mus., pp. 904, 920.
1896. Hemitrypa. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 282.
1897. Hemitrypa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pp. 507, 520.

Hemitrypa aspera Ulrich.

1890. Hemitrypa aspera. Ulrich, Geol. Sur. Illinois, VIII, p. 563, pl. lvii, 4–4*f*, 3*a*.
1894. Hemitrypa aspera. Keyes, Missouri Geol. Sur., V, p. 25.
Keokuk: Keokuk and Bentonsport, Iowa; Nauvoo, Illinois.

Hemitrypa biordo Hall.

1885. Hemitrypa biordo. Hall, Rep. State Geologist New York for the year 1884, p. 36, pl. ii, 11.
1887. Fenestella (Hemitrypa) biordo. Hall and Simpson, Pal. New York, VI, p. 149.
1889. Hemitrypa biordo. Miller, North American Geol. Pal., fig. 487 (p. 309).
Upper Helderberg: Walpole, Ontario.

Hemitrypa biserialis (Hall).

1879. Fenestella (Hemitrypa) biserialis. Hall, Thirty-second Ann. Rep. New York State Mus., p. 174 (reprint, 1880, p. 36).
1883. Fenestella (Hemitrypa) biserialis (in part). Hall, Rep. State Geologist New York for the year 1882, pl. xxii, 13–18.
1887. Fenestella (Hemitrypa) biserialis. Hall and Simpson, Pal. New York, VI, p. 57, pl. xxii, 13, 16–18.
Lower Helderberg: Clarksville, New York.

Hemitrypa biserialis-exilis (Hall and Simpson).

1883. Fenestella (Hemitrypa) biserialis (in part). Hall, Rep. State Geologist New York for the year 1882, pl. xxii, 13–18.
1887. Fenestella (Hemitrypa) biserialis var. exilis. Hall and Simpson, Pal. New York, VI, p. 57, pl. xxii, 14, 15.
Lower Helderberg: Clarksville, New York.

Hemitrypa columellata (Hall and Simpson).
1887. Fenestella (Hemitrypa) columellata. Hall and Simpson, Pal. New York, VI, p. 146.
1897. Hemitrypa columellata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 51–53 (p. 508), pl. v, 3–11.
Upper Helderberg: Walpole, Ontario.

Hemitrypa cribrosa (Hall).
1883. Fenestella (Hemitrypa) cribrosa. Hall, Trans. Albany Institute, X, p. 177 (abstract, 1881, p. 35).
1887. Fenestella (Hemitrypa) cribrosa. Hall and Simpson, Pal. New York, VI, p. 145.
1897. Hemitrypa cribrosa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. v, 1, 2.
Hamilton: Falls of the Ohio.

Hemitrypa dubia Hall. See Loculipora ambigua (Hall).

Hemitrypa favosa (Hall).
1883. Fenestella (Hemitrypa) favosa. Hall, Trans. Albany Institute, X, p. 177 (abstract, 1881, p. 35).
1887. Fenestella (Hemitrypa) favosa. Hall and Simpson, Pal. New York, VI, p. 148.
Upper Helderberg: Walpole, Ontario.

Hemitrypa hemitrypa (Prout) Keyes. See Hemitrypa proutana Ulrich.

Hemitrypa nodosa Ulrich.
1890. Hemitrypa nodosa. Ulrich Geol. Sur. Illinois, VIII, p. 562, pl. lvii, 3.
1894. Hemitrypa nodosa. Keyes, Missouri Geol. Sur., V, p. 25.
Keokuk: Nauvoo, Illinois; Keokuk and Bentonsport, Iowa.

Hemitrypa pateriformis Ulrich.
1890. Hemitrypa pateriformis. Ulrich, Geol. Sur. Illinois, VIII, p. 564, pl. lvii, 7–7*c*.
1894. Hemitrypa pateriformis. Keyes, Missouri Geol. Sur., V, p. 26.
Keokuk: Keokuk, Iowa.

Hemitrypa perstriata Ulrich.
1890. Hemitrypa perstriata. Ulrich, Geol. Sur. Illinois, VIII, p. 564, pl. lvii, 6, 6*a*.
1894. Hemitrypa perstriata. Keyes, Missouri Geol. Sur., V, p. 25.
Keokuk: Keokuk and Bentonsport, Iowa.

Hemitrypa plumosa (Prout).
1858. Fenestella plumosa. Prout, Trans. St. Louis Acad. Sci., I, p. 236. pl. xv, 2, 2*a*.
1889. Hemitrypa plumosa. Miller, North American Geol. Pal., p. 309.
Warsaw: Warsaw, Illinois; Barretts Station, Missouri.

Hemitrypa prima Hall. See Unitrypa nervia (Hall).

Hemitrypa proutana Ulrich.
1859. Fenestella hemitrypa. Prout, Trans. St. Louis Acad. Sci., I, p. 444, pl. xvii, 4, 4*a*.
1890. Hemitrypa proutana. Ulrich, Geol. Sur. Illinois, VIII, p. 560, pl. lvii, 1–1*c*.
1894. Hemitrypa hemitrypa. Keyes, Missouri Geol. Sur., V, p. 25.
Keokuk: Warsaw, Illinois; Keokuk, Iowa.
Warsaw: Warsaw and Monroe County, Illinois; Barretts Station, Missouri.
St. Louis: Caldwell County, Kentucky.

Hemitrypa proutana-nodulosa Ulrich.

1890. Hemitrypa proutana var. nodulosa. Ulrich, Geol. Sur. Illinois, VIII, p. 562, pl. lvii, 2–2*c*.

Keokuk: Bentonsport and Keokuk, Iowa; Nauvoo, Illinois.

Hemitrypa proutana-vermifera Ulrich.

1890. Hemitrypa proutana var. vermifera. Ulrich, Geol. Sur. Illinois, VIII, p. 561, pl. lvii, 5, 5*a*.

Warsaw: Warsaw, Illinois.

Hemitrypa tenera Ulrich.

1890. Hemitrypa tenera. Ulrich, Geol. Sur. Illinois, VIII, p. 559, pl. xliv, 7, 7*a*, pl. liv, 10–10*c*.

Hamilton: Davenport and Buffalo, Iowa; Rock Island, Illinois.

Hemitrypa ulrichi Foerste.

1887. Hemitrypa ulrichi. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 152; ibid., III, 1888, pl. xv, 2.

1895. Hemitrypa ulrichi. Foerste, Geol. Sur. Ohio, VII, p. 599, pl. xxviii, 2.

Clinton: Near New Carlisle, Ohio.

HERNODIA Hall. Genotype: Hernodia humifusa Hall.

1883. Hernodia Hall, Trans. Albany Institute, X, p. 196 (abstract, 1881, p. 196).

1884. Hernodia. Hall, Rep. State Geologist New York for the year 1883, p. 58.

1887. Hernodia. Hall and Simpson, Pal. New York, VI, p. xxvi.

1889. Hernodia. Miller, North American Geol. Pal., p. 309.

1897. Hernodia. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 596.

Hernodia humifusa Hall.

1883. Hernodia humifusa. Hall, Trans. Albany Institute, X, p. 196 (abstract, 1881, p. 196).

1884. Hernodia humifusa. Hall, Rep. State Geologist New York for the year 1883, p. 58.

1887. Hernodia humifusa. Hall and Simpson, Pal. New York, VI, p. 281, pl. lxv, 20, 21.

1897. Hernodia humifusa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxv, 1, 2.

Hamilton: Cazenovia, Madison County, New York; Falls of the Ohio.

Heterodictya Nicholson. See Ptilodictya Lonsdale.

Heterodictya gigantea Nicholson. See Ptilodictya gigantea (Nicholson).

Heterodictya pavonia Ulrich. See Escharopora pavonia (D'Orbigny).

HETEROTRYPA Nicholson. Genotype: Monticulipora frondosa D'Orbigny (not Nicholson).

1879. Heterotrypa (in part). Nicholson, Pal. Tabulate Corals, p. 291.

1881. Heterotrypa. Nicholson, Genus Monticulipora, pp. 101, 103.

1882. Heterotrypa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 155; ibid., VI, 1883, p. 83.

1883. Heterotrypa. Foord, Contr. Micro-Pal. Cambro-Sil., p. 20.

1890. Heterotrypa. Ulrich, Geol. Sur. Illinois, VIII, pp. 371, 413.

1893. Heterotrypa. Ulrich, Geol. Minnesota, III, p. 267.

1896. Heterotrypa (in part). Zittel's Textb. Pal. (Engl. ed.), p. 104.

1896. Heterotrypa. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 273.

1897. Heterotrypa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 578.

Heterotrypa affinis (Ulrich).

1890. Amplexopora affinis. Ulrich, Geol. Sur. Illinois, VIII, p. 450, pl. xxxvi, 2, 2*a*.

Cincinnati (Richmond): Wilmington, Illinois; Richmond, Indiana.

Heterotrypa ? barrandei (Nicholson).

1874. Chætetes Barrandi. Nicholson, Geol. Mag., new ser., I, p. 57, pl. iv. 7*c*.
1874. Chætetes Barrandi. Nicholson, Pal. Province Ontario, p. 60, fig. 17*c*.
1881. Monticulipora (Heterotrypa) Barrandi. Nicholson, Genus Monticulipora, p. 139, pl. i, 2–2*d*.
1882. Amplexopora barrandi. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 255.

Hamilton: Widder, Ontario.

Heterotrypa frondosa (D'Orbigny).

1850. Monticulipora frondosa. D'Orbigny, Prodr. de Pal., I, p. 25.
1851. Chætetes frondosus. Milne-Edwards and Haime, Pol. Foss. Terr. Pal., p. 267, pl. xix, 5, 5*a*.
1854. Monticulipora frondosa. Milne-Edwards and Haime, Brit. Foss. Corals, p. 265.
1860. Monticulipora frondosa. Milne-Edwards, Hist. Nat. des Corall., III, p. 276.
1882. Monticulipora frondosa. White, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 380, pl. xlviii, 2, 3.
1882. Heterotrypa frondosa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 235.
1881. Chætetes frondosus. Quenstedt, Roehren- und Sternkorallen, p. 73, pl. cxlvi, 8 (not 3–5).
1881. Chætetes frondosus limatus. Quenstedt, Roehren- und Sternkorallen, p. 74, pl. cxlvi, 9.
1874. Chætetes mammulatus (not of D'Orbigny). Nicholson, Quar. Jour. Geol. Soc. London, XXX, p. 508, pl. xxx, 2-2*b*.
1875. Chætetes mammulatus (not of D'Orbigny). Nicholson, Pal. Ohio, II, p. 207.
1879. Monticulipora (Heterotrypa) mammulata (not of D'Orbigny). Nicholson, Pal. Tabulate Corals, p. 294, pl. xiii, 1–1*b*.
1881. Monticulipora (Heterotrypa) mammulata (not of D'Orbigny). Nicholson, Genus Monticulipora, p. 104, pl. vi, 1–1*g*.
1888. Monticulipora mammulata (not of D'Orbigny). James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 16.
1895. Monticulipora mammulata (not of D'Orbigny). J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 69.

Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.

Heterotrypa inflecta Ulrich.

1890. Heterotrypa inflecta. Ulrich, Geol. Sur. Illinois, VIII, p. 414, pl. xxxvii, 2–2*d*.
1895. Monticulipora inflecta. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 77.

Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.

Heterotrypa ? moniliformis (Nicholson).

1874. Chætetes moniliformis. Nicholson, Geol. Mag., new ser., I, p. 57, pl. iv, 7*a*, 7*b*.
1874. Chætetes moniliformis. Nicholson, Pal. Province Ontario, p. 60, fig. 17*a*, *b*.
1881. Monticulipora (Heterotrypa) moniliformis. Nicholson, Genus Monticulipora, p. 137, pl. i, 1–1*c*.

Heterotrypa ? moniliformis (Nicholson)—Continued.

1882. Amplexopora moniliformis. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 255.
Hamilton: Widder, Ontario.

Heterotrypa paupera (Ulrich).

1883. Dekayia paupera. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 153, pl. vi, 10, 10*a*.
Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.

Heterotrypa prolifica Ulrich. See Heterotrypa subramosa-prolifica Ulrich.

Heterotrypa singularis Ulrich.

1890. Heterotrypa singularis. Ulrich, Geol. Sur. Illinois, VIII, p. 415, pl. xxxvii, 3–3*e*.
1893. Heterotrypa singularis. Ulrich, Geol. Minnesota, III, p. 268.
1895. Monticulipora singularis. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 77.
1897. Heterotrypa singularis. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 147 (p. 579).
Cincinnati (Richmond): Wilmington, Illinois; Iron Ridge, Wisconsin.

Heterotrypa solitaria Ulrich.

1883. Heterotrypa solitaria. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 88, pl. i, 3–3*b*.
Cincinnati (Lorraine): Covington, Kentucky; Maury County, Tennessee.

Heterotrypa subpulchella (Nicholson).

1875. Chætetes subpulchellus. Nicholson, Pal. Ohio, II, p. 196, pl. xxi, 6, 6*a*.
1881. Monticulipora (Heterotrypa) subpulchella. Nicholson, Genus Monticulipora, p. 134, fig. 23, pl. v, 2, 2*a*.
1883. Heterotrypa subpulchella. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 83.
1888. Monticulipora subpulchella. James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 181.
1894. Monticulipora subpulchella. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 204.
Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.

Heterotrypa subramosa (Ulrich).

1879. Atactopora subramosa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., II, p. 124, pl. xii, 6–6c.
Cincinnati (Richmond): Jacksonburg and Hanover, Ohio.
Obs. See also Monticulipora ?? clintonensis James.

Heterotrypa subramosa-prolifica Ulrich.

1890. Heterotrypa prolifica. Ulrich, Geol. Sur. Illinois, VIII, p. 413, pl. xxxvii, 1–1*d*.
1893. Heterotrypa prolifica. Ulrich, Geol. Minnesota, III, p. 268.
1895. Monticulipora prolifica. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 75.
1897. Heterotrypa prolifica. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 145, 146 (p. 579).
Cincinnati (Richmond): Blanchester, Waynesville, and other localities in Ohio; Richmond and Versailles, Indiana; Wilmington, Illinois; Iron Ridge, Wisconsin.

Heterotrypa vaupeli Ulrich. See Nicholsonella vaupeli (Ulrich).

HEXAGONELLA Waagen and Wentzel. Genotype: Hexagonella ramosa Waagen and Wentzel.

1886. Hexagonella. Waagen and Wentzel, Pal. Indica, Ser. XIII, pp. 909, 911.

Obs.—This genus is known in America by two undescribed species, one from the Hamilton at the Falls of the Ohio, the other from the Warsaw at Clarksville, Tennessee.

Hippothoa Lamouroux. Not a Paleozoic genus.

Hippothoa delicatula James. See Stomatopora delicatula (James).

Hippothoa inflata Nicholson. See Stomatopora inflata (Hall).

HOMOTRYPA Ulrich. Genotype: Homotrypa curvata Ulrich.

1882. Homotrypa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 240.
1883. Homotrypa. Foord, Contr. Micro-Pal. Cambro-Sil., p. 9.
1889. Homotrypa. Miller, North American Geol. Pal., p. 309.
1890. Homotrypa. Ulrich, Geol. Sur. Illinois, VIII, pp. 370, 409.
1893. Homotrypa. Ulrich, Geol. Minnesota, III, p. 235.
1896. Homotrypa. Ulrich, Zittel's Textb. Pal., (Engl. ed.), p. 273.
1897. Homotrypa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 575.

Homotrypa ? arbuscula Ulrich.

1890. Homotrypa arbuscula. Ulrich, Geol. Sur. Illinois, VIII, p. 409, pl. xxxviii, 3–3c.
1894. Homotrypa arbuscula. Keyes, Missouri Geol. Sur., V, p. 13.

Trenton (Stones River): High Bridge, Kentucky; Calhoun County and Dixon, Illinois.

Homotrypa callosa Ulrich.

1893. Homotrypa callosa. Ulrich, Geol. Minnesota, III, p. 243, pl. xx, 15–21.
1897. Homotrypa callosa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 139, 140 (p. 576).

Trenton: Burgin, Frankfort, and Garrard County, Kentucky; Cannon Falls, Minnesota.

Homotrypa ? confluens (Foerste).

1887. Monotrypella confluens. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 172; ibid., III, 1888, pl. xvi, 4.
1895. Homotrypa confluens. Foerste, Geol. Sur. Ohio, VII, p. 600.

Clinton: Dayton, Ohio.

Homotrypa curvata Ulrich.

1882. Homotrypa curvata. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 242, pl. x, 7–7*d*.
1895. Monticulipora curvata. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 71.
1897. Homotrypa curvata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 137, 138 (p. 576).

Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.

Homotrypa dawsoni (Nicholson).

1881. Monticulipora (Heterotrypa) Dawsoni. Nicholson, Genus Monticulipora, p. 141, pl. v, 3–3*f*.
1882. Monticulipora dawsoni. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 241.
1888. Monticulipora dawsoni. James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 15.

Homotrypa dawsoni (Nicholson)—Continued.

1895. Monticulipora dawsoni. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 68.

Cincinnati (Lorraine and Richmond): Cincinnati, Waynesville, Clarksville, and Oregonia, Ohio; Versailles, Indiana.

Homotrypa exilis Ulrich.

1886. Homotrypa exilis. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Sur. Minnesota, p. 80.

1893. Homotrypa exilis. Ulrich, Geol. Minnesota, III, p. 236, pl. xix, 10–16.

Trenton (Stones River): Minneapolis, Minnesota.

Homotrypa flabellaris Ulrich.

1890. Homotrypa flabellaris. Ulrich, Geol. Sur. Illinois, VIII, p. 411, pl. xxxii, 3–3*c*.

1895. Monticulipora flabellaris. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 75.

Cincinnati (Lorraine and Richmond): Wilmington, Illinois; a common form in the Lorraine and Richmond groups of Ohio, Indiana, Kentucky, and Tennessee.

Homotrypa gelasinosa Ulrich.

1890. Homotrypa gelasinosa. Ulrich, Geol. Sur. Illinois, VIII, p. 410, pl. xxxii, 2–2*d*.

1894. Monticulipora gelasinosa. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 202.

Cincinnati (Richmond): Wilmington, Illinois.

Homotrypa insignis Ulrich. See Homotrypa subramosa-insignis Ulrich.

Homotrypa ? intercalaris Ulrich.

1893. Homotrypa ? intercalaris. Ulrich, Geol. Minnesota, III, p. 238, fig. 13.

Trenton (Black River): St. Paul and Minneapolis, Minnesota.

Homotrypa minnesotensis Ulrich.

1886. Homotrypa minnesotensis. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Sur. Minnesota, p. 79.

1893. Homotrypa minnesotensis. Ulrich, Geol. Minnesota, III, p. 235, pl. xix, 1–9.

Trenton (Stones River and Black River): Minneapolis, St. Paul, Lanesboro, Cannon Falls, Preston, and Fountain, Minnesota; Decorah, Iowa; Curdsville, Kentucky; Hartsville, Tennessee.

Homotrypa minnesotensis-montifera Ulrich.

1893. Homotrypa minnesotensis var. montifera. Ulrich, Geol. Minnesota, III. p. 236, pl. xix, 3*a*.

Trenton (Black River): St. Paul, Minnesota.

Homotrypa obliqua Ulrich.

1882. Homotrypa obliqua. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 243, pl. x, 6, 6*b*.

1889. Homotrypa obliqua. Miller, North American Geol. Pal., fig. 489 (p. 310).

1896. Homotrypa obliqua. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 124.

Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.

Homotrypa separata Ulrich.

1893. Homotrypa separata. Ulrich, Geol. Minnesota, III, p. 237, pl. xix, 17–20.

Trenton (Stones River): Minneapolis, Chatfield, and Preston, Minnesota.

Homotrypa ? similis Foord.

1883. Homotrypa similis. Foord, Contr. Micro-Pal. Cambro-Sil., p. 10, pl. ii, 2–2*d*.

1893. Homotrypa similis. Ulrich, Geol. Minnesota, III, p. 242, pl. xx, 28–33.

Trenton: Ottawa City, Ottawa; St. Paul, Cannon Falls, and Kenyon, Minnesota.

Homotrypa ? solida (Hall).

1852. Trematopora solida. Hall, Pal. New York, II, p. 153, pl. xlA, 6*a–c*.

Niagara: Lockport, New York.

Homotrypa subramosa Ulrich.

1886. Homotrypa subramosa. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Sur. Minnesota, p. 81.

1893. Homotrypa subramosa. Ulrich, Geol. Minnesota, III, p. 239, pl. xix, 21–28.

1896. Homotrypa subramosa. Ulrich, Zittel's Textb. Pal. (Engl. ed.), fig. 451 A–C (not D = Homotrypa separata Ulrich) (p. 273).

Trenton (Black River): St. Paul, Minneapolis, and Goodhue County, Minnesota.

Homotrypa subramosa-insignis Ulrich.

1886. Homotrypa insignis. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Sur. Minnesota, p. 82.

1893. Homotrypa subramosa var. insignis. Ulrich, Geol. Minnesota, III, p. 239.

Trenton: St. Paul and Goodhue and Fillmore counties, Minnesota; Decorah, Iowa.

Homotrypa tuberculata Ulrich.

1893. Homotrypa tuberculata. Ulrich, Geol. Minnesota, III, p. 240, fig. 14.

Trenton (Black River): Cannon Falls, Minnesota.

HOMOTRYPELLA Ulrich. Genotype: Homotrypella instabilis Ulrich.

1886. Homotrypella. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Sur. Minnesota, p. 83.

1889. Homotrypella. Miller, North American Geol. Pal., p. 310.

1890. Homotrypella. Ulrich, Geol. Sur. Illinois, VIII, pp. 370, 412.

1893. Homotrypella. Ulrich, Geol. Minnesota, III, p. 228.

1897. Homotrypella. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 586.

Homotrypella contexta Ulrich.

1890. Homotrypella contexta. Ulrich, Geol. Sur. Illinois, VIII, p. 412, pl. xxxii, 5–5*b*.

1895. Monticulipora contexta. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 74.

Cincinnati (Richmond): Wilmington, Illinois.

Homotrypella gracilis Ulrich. See Bythopora gracilis (Nicholson)

Homotrypella granulifera (Ulrich.)

1879. Chætetes granuliferus. Ulrich, Jour. Cincinnati Soc. Nat. Hist., II, p. 128, pl. xii, 9–9*b*.

1882. Batostomella granulifera. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 141.

1889. Homotrypella granulifera. Miller, North American Geol. Pal., p. 310.

1896. Monticulipora (Fistulipora) granulifera. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 120.

Trenton: Burgin and Frankfort, Kentucky.

Homotrypella instabilis Ulrich.

1886. Homotrypella instabilis. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Sur. Minnesota, p. 83.
1893. Homotrypella instabilis. Ulrich, Geol. Minnesota, III, p. 229, pl. xviii, 9–20.
1897. Homotrypella instabilis. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 168, 169 (p. 586).
Trenton (Black River): Minneapolis, St. Paul, Cannon Falls, and Fountain, Minnesota.

Homotrypella meeki Ulrich. See Bythopora meeki (James).

Homotrypella multiporata Ulrich.

1893. Homotrypella multiporata. Ulrich, Geol. Minnesota, III, p. 230, pl. xviii, 21, 22.
Trenton (Black River): St. Paul and Minneapolis, Minnesota.

Homotrypella mundula Ulrich.

1893. Homotrypella mundula. Ulrich, Geol. Minnesota, III, p. 232, fig. 12*a–c*.
Trenton: Decorah, Iowa; Cannon Falls, Minnesota; Frankfort, Kentucky.

Homotrypella ? ovata Ulrich.

1893. Homotrypella ? ovata. Ulrich, Geol. Minnesota, III, p. 231, pl. xviii, 23–30.
Trenton (Black River and Trenton): Cannon Falls and Minneapolis, Minnesota.

Homotrypella rustica Ulrich.

1893. Homotrypella rustica. Ulrich, Geol. Minnesota, III, p. 234, pl. xviii, 31–33.
1896. Monticulipora (Fistulipora) rustica. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 120.
Cincinnati (Richmond): Spring Valley, Minnesota.

Homotrypella ? subgracilis Ulrich.

1893. Homotrypella ? subgracilis. Ulrich, Geol. Minnesota, III, p. 230, pl. xxvi, 10–16.
Trenton (Black River): Minneapolis and St. Paul, Minnesota.
Obs. This species may be a Bythopora.

Hornera Lamouroux. Not a Paleozoic genus.

Hornera ? dichotoma Hall. See Thamniscus dichotomus (Hall).

HYPHASMOPORA Etheridge, Jun. Genotype: Hyphasmopora buskii Etheridge, Jun., from the Carboniferous shales of Scotland.

1875. Hyphasmopora. Etheridge, Jun., Ann. Mag. Nat. Hist., ser. 4, XV, p. 43.
1889. Hyphasmopora. Vine, Proc. Yorkshire Geol. Polyt. Soc., XI, p. 188.
Obs. No American species have yet been referred to this genus.

ICHTHYORACHIS McCoy. Genotype: Ichthyorachis newenhami McCoy.

1844. Ichthyorachis. McCoy, Syn. Carb. Foss. Ireland, p. 205.
1887. Ichthyorachis. Hall and Simpson, Pal. New York, VI, p. xxv.
1889. Ichthyorachis. Miller, North American Geol. Pal., p. 310.
1897. Ichthyorachis. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 524.

Ichthyorachis nereis Hall.

1874. Ichthyorachis Nereis. Hall, Twenty-sixth Ann. Rep. New York State Museum, p. 98.

Ichthyorachis nereis Hall—Continued.

1879. Ichthyorachis Nereis. Hall, Thirty-second Ann. Rep. New York State Museum, p. 174 (reprint, 1880, p. 36).

1883. Ichthyorachis Nereis. Hall, Rep. State Geologist New York, for the year 1882, pl. xxii, 19–21.

1887. Ichthyorachis Nereis. Hall and Simpson, Pal. New York, VI, p. 66, pl. xxii, 19–21.

1897. Ichthyorachis Nereis. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. viii, 19–21.

Lower Helderberg: Schoharie, New York.

IDIOTRYPA Ulrich. Genotype: Idiotrypa parasitica Ulrich.

1883. Idiotrypa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 272.

1889. Idiotrypa. Miller, North American Geol. Pal., p. 310.

1890. Idiotrypa. Ulrich, Geol. Sur. Illinois, VIII, p. 375.

1897. Idiotrypa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 591.

Idiotrypa parasitica Ulrich.

1883. Idiotrypa parasitica. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 273, pl. xiii, 1–1*c*.

1897. Idiotrypa parasitica. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 187–189 (p. 591).

Niagara: Osgood, Indiana.

INTRAPORA Hall. Genotype: Intrapora puteolata Hall.

1883. Intrapora. Hall, Trans. Albany Institute, X, p. 157 (abstract, 1881, p. 16).

1887. Intrapora. Hall and Simpson, Pal. New York, VI, p. xxii.

1889. Intrapora. Miller, North American Geol. Pal., p. 310.

1890. Intrapora. Ulrich, Geol. Sur. Illinois, VIII, p. 394.

1897. Intrapora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 535.

Obs. See also Coscinella Hall and Simpson.

Intrapora basalis Ulrich.

1890. Stictoporella basalis. Ulrich, Geol. Sur. Illinois, VIII, p. 532, pl. lxxv, 5–5*c*, pl. lxviii, 5, 5*a*, pl. lxix, 2, 2*a*.

1894. Stictoporella basalis. Keyes, Missouri Geol. Sur., V, p. 22.

1897. Stictoporella basalis. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year ending 1894, figs, 91, 92 (p. 536).

Warsaw: Warsaw, Illinois.

Intrapora cosciniformis Ulrich. See Coscinella cosciniformis (Nicholson.

Intrapora elegantula Whiteaves. See Coscinella elegantula Hall and Simpson.

Intrapora puteolata Hall.

1883. Intrapora puteolata. Hall, Trans. Albany Institute, X, p. 158 (abstract, 1881, p. 16).

1886. Intrapora puteolata. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxix, 18–26.

1887. Intrapora puteolata. Hall and Simpson, Pal. New York, VI, p. 97, pl. xxix, 18–26.

1897. Intrapora puteolata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xi, 1–9.

Hamilton: Falls of the Ohio.

Intrapora undulata (Ulrich).

1890. Stictoporella ? undulata. Ulrich, Geol. Sur. Illinois, VIII, p. **533**, **pl. lxix**, 6–6*b*.

Chester: Litchfield, Kentucky.

Intricaria Defrance. Not a Paleozoic genus.

Intricaria **clathrata** Miller and Dyer. See Phylloporina **clathrata** (Miller and Dyer).

Intricaria ? reticulata Hall. See Phylloporina reticulata (Hall.)

ISOTRYPA Hall. Genotype: Fenestella (Isotrypa) conjunctiva Hall.

1885. Isotrypa. Hall, Rep. State Geologist New York for the year 1884, p. 37.

1887. Isotrypa. Hall and Simpson, Pal. New York, VI, p. xxiii.

1889. Isotrypa. Miller, North American Geol. Pal., p. 310.

1890. Isotrypa (emend.). Ulrich, Geol. Sur. Illinois, VIII, p. 395.

1895. Isotrypa. Simpson, Thirteenth Ann. Rep. State Geologist New York for the year 1893, pp. 689, 714, 726; Forty-seventh Ann. Rep. New York State Museum, pp. 883, 908, 920.

1895. Isotrypa. Whidborne, Devon. Fauna England, (Pal. Soc. Publ.), II, Part 4, p. 180.

1897. Isotrypa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pp. 510, 520.

1895. Tectuliporella. Simpson, Thirteenth Ann. Rep. State Geologist New York for the year 1893, pp. 715, 726; Forty-seventh Ann. Rep. New York State Museum, pp. 909, 920.

1897. Tectuliporella. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pp. 510, 520.

Obs. Specimens of the type species of Tectuliporella show that the pore on the reverse side is frequently wanting and generally not uniformly developed. Hence there is no ground for Tectuliporella.

Isotrypa ambigua Ulrich. See Loculipora ambigua (Hall).

Isotrypa bifaria Hall. See Isotrypa conjunctiva (Hall).

Isotrypa conjunctiva (Hall).

1883. Fenestella (Hemitrypa) conjunctiva. Hall, Trans. Albany Institute, X, p. 178 (abstract, 1881, p. 36).

1887. Fenestella (Isotrypa) conjunctiva. Hall and Simpson, Pal. New York, VI, p. 143, pl. liv, 10–21.

1889. Isotrypa conjunctiva. Miller, North American Geol. Pal., fig. 490 (p. 310).

1897. Isotrypa conjunctiva. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 59 (p. 310), pl. vi, 7–12.

1885. Isotrypa bifaria (in error). Hall, Rep. State Geologist New York for the year 1884, pl. ii, 13, 16.

Upper Helderberg: Walpole, Ontario.

Isotrypa consimilis Hall.

1885. Isotrypa consimilis. Hall, Rep. State Geologist New York for the year 1884, pl. ii, 14.

1887. Fenestella (Unitrypa?) consimilis. Hall and Simpson, Pal. New York, VI, p. 142, pl. liv, 7–9.

1897. Tectuliporella consimilis. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. vi, 13–15.

Upper Helderberg: Walpole, Ontario.

Leioclema. See Lioclema.

Leioclema singulare Ulrich. See Trematopora ? singularis (Hall).

LEPTOTRYPA Ulrich. Genotype: Leptotrypa minima Ulrich.

1883. Leptotrypa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 158.
1889. Leptotrypa. Miller, North American Geol. Pal., p. 311.
1890. Leptotrypa. Ulrich, Geol. Sur. Illinois, VIII, pp. 377, 455.
1893. Leptotrypa. Ulrich, Geol. Minnesota, III, p. 316.
1897. Leptotrypa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 580.

Leptotrypa ? acervulosa Ulrich.

1893. Leptotrypa acervulosa. Ulrich, Geol. Minnesota, III, p. 318, pl. xxvii, 24, 25.
Trenton: Decorah, Iowa; Goodhue County, Minnesota; Burgin and Frankfort, Kentucky.

Leptotrypa calceola (Miller and Dyer).

1878. Monticulipora calceola. Miller and Dyer, Jour. Cincinnati Soc. Nat. Hist., I, p. 26, pl. i, 11, 11*a*.
1881. Monticulipora (Monotrypa) calceola. Nicholson, Genus Monticulipora, p. 185, pl. i, 3–3*e*.
1883. Leptotrypa calceola. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 159.
1888. Monticulipora calceola. James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 27.
1895. Monticulipora calceola. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 87.
Cincinnati (Lorraine): Cincinnati, Ohio.

Leptotrypa clavacoidea (James).

1871. Chætetes clavacoideus. James, Catal. Lower Sil. Foss., p. 1. (Only named.)
1875. Chætetes clavacoideus. James, Catal. Foss. Cincinnati Group, p. 1.
1881. Monticulipora (Monotrypa) clavacoidea. Nicholson, Genus Monticulipora, p. 182, fig. 37.
1883. Leptotrypa clavacoidea. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 159.
1888. Monticulipora clavacoidea. James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 25.
1895. Monticulipora clavacoidea. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 84.
Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.

Leptotrypa ? claviformis Ulrich.

1893. Leptotrypa claviformis. Ulrich, Geol. Minnesota, III, p. 319, pl. xxvii, 20, 21.
Trenton (Black River): Minneapolis and St. Paul, Minnesota.

Leptotrypa ? clavis Ulrich.

1883. Leptotrypa clavis. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 161, pl. vi, 3, 3*a*.
Cincinnati (Utica): Cincinnati, Ohio, and vicinity.

Leptotrypa ? cortex Ulrich.

1883. Leptotrypa cortex. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 162.
Cincinnati (Utica): Covington and Newport, Kentucky.

Leptotrypa discoidea Ulrich. See Amplexopora ? discoidea (James).

Leptotrypa ? dychei (James).

1882. Monticulipora (Monotrypa) dychei. James, Paleontologist, No. 6, p. 52.
1883. Monticulipora dychei. James, Jour. Cincinnati Soc. Nat. Hist., VI, p. 235, pl. x, 2–2*e*.
1888. Monticulipora dychei. James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 25.
1895. Monticulipora dychei. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 83.
Cincinnati (Lorraine): Lebanon, Ohio.

Leptotrypa filiosa Ulrich. See Amplexopora filiosa (D'Orbigny).

Leptotrypa ? hexagonalis Ulrich.

1890. Leptotrypa hexagonalis. Ulrich, Geol. Sur. Illinois, VIII, p. 455, pl. xxxvi, 6, 6*a*.
1893. Leptotrypa hexagonalis. Ulrich, Geol. Minnesota, III, p. 317.
Trenton (Stones River): Mineral Point, Janesville, and Beloit, Wisconsin; Calhoun County, Illinois; Minneapolis, Minnesota.

Leptotrypa informis Ulrich.

1893. Leptotrypa informis. Ulrich, Geol. Minnesota, III, p. 317, pl. xxvii, 22, 23.
Trenton (Stones River): Minneapolis and St. Paul, Minnesota.

Leptotrypa ? irregularis (Ulrich).

1879. Chætetes irregularis. Ulrich, Jour. Cincinnati Soc. Nat. Hist., II, p. 129, pl. xii, 10–10*b*.
1881. Monticulipora (Monotrypa) irregularis. Nicholson, Genus Monticulipora, p. 177, fig. 35.
1882. Monotrypa irregularis. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 256.
1888. Monticulipora irregularis. James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 163.
1893. Monticulipora irregularis. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XV, p. 159.
Cincinnati (Lorraine): Hamilton, Morrow, Mason, and Cincinnati, Ohio.

Leptotrypa maculata Ulrich. See Paleschara ? maculata Hall.

Leptotrypa minima Ulrich.

1883. Leptotrypa minima. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 159, pl. vi, 2–2*b*.
Cincinnati (Lorraine): Hamilton, Ohio.

Leptotrypa offula Ulrich. See Paleschara ? offula Hall.

Leptotrypa ornata Ulrich.

1883. Leptotrypa ornata. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 160, pl. vi, 4, 4*a*.
Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.

Leptotrypa ? quadrangularis (Nicholson).

1874. Chætetes quadrangularis. Nicholson, Geol. Mag., new ser., I, p. 58, pl. iv, 8.
1874. Chætetes quadrangularis. Nicholson, Pal. Province Ontario, p. 61, fig. 18, *a*, *b*.
1889. Paleschara quadrangularis. Miller, North American Geol. Pal., p. 177.
1890. Leptotrypa quadrangularis. Ulrich, Geol. Sur. Illinois, VIII, p. 455.
1891. Paleschara quadrangularis. Whiteaves, Contr. Canadian Pal., I, p. 213.
1892. Leptotrypa quadrangularis. Whiteaves, Contr. Canadian Pal., I, p. 277.
1883. Paleschara amplectens. Hall, Trans. Albany Institute, X, p. 179 (abstract, 1881, p. 179).

Leptotrypa ? quadrangularis (Nicholson)—Continued.

1884. Paleschara amplectens. Hall, Rep. State Geologist New York for the year 1883, p. 7.

1887. Paleschara amplectens. Hall and Simpson, Pal. New York, VI, p. 237.

1891. Paleschara amplectens. Hall, Tenth Ann. Rep. State Geologist New York for the year 1890, p. 40; Forty-fourth Ann. Rep. New York State Museum, p. 70.

1899. Paleschara amplectens. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 171.

Hamilton: Arkona, Ontario; Seneca Lake, New York (Hall); Hay River, Red Deer River, and near Dawson Bay, Canada (Whiteaves).

Leptotrypa ? semipilaris Ulrich.

1890. Leptotrypa semipilaris. Ulrich, Geol. Sur. Illinois, VIII, p. 457, pl. xxxvi, 5–5*d*.

1894. Leptotrypa semipilaris. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 181.

1897. Leptotrypa semipilaris. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 148 (not 149, 150=Leptotrypa acervulosa), p. 580.

Cincinnati (Lorraine): Covington, Kentucky; Cincinnati, Ohio.

Leptotrypa ? sphærion (Hall).

1876. Paleschara ? sphærion. Hall, Twenty-eighth Ann. Rep. New York State Museum (documentary edition), pl. viii, 14, 15.

1879. Paleschara ? (Chætetes?) sphærion. Hall, Twenty-eighth Ann. Rep. New York State Museum (Museum edition), p. 121, pl. viii, 14, 15.

1882. Paleschara ? (Chætetes ?) sphærion. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 247, pl. vii, 14, 15.

Niagara: Waldron, Indiana.

Leptotrypa stidhami Ulrich.

1890. Leptotrypa stidhami. Ulrich, Geol. Sur. Illinois, VIII, p. 456, pl. xxxvi, 4–4*b*.

1895. Monticulipora stidhami. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 76.

Cincinnati (Richmond): Brown County and near Eaton, Ohio; Madison, Indiana.

Lichenalia (not of Hall, 1852), Hall and Simpson, and other authors. See Fistulipora McCoy.

LICHENALIA Hall. Genotype: Lichenalia concentrica Hall.

1852. Lichenalia. Hall, Pal. New York, II, p. 171.

Obs. With the Lichenalia concentrica from Lockport, New York, Hall identified a form bearing a superficial resemblance, occurring at Waldron, Indiana; the latter is a species of Fistulipora and entirely different in structure from the Lockport Lichenalia concentrica. In his later work, and in this he has been followed by other authors, Hall used the Waldron form as the type of the genus. Consult the synonymy given under Fistulipora.

Lichenalia alternata Hall. See Fistulipora alternata (Hall).

Lichenalia alveata Hall. See Buskopora bistriata (Hall).

Lichenalia (Odontotrypa) alveata Hall. See Buskopora bistriata (Hall).

Lichenalia bistriata Hall. See Buskopora bistriata (Hall).

Lichenalia bullata Hall. See Fistulipora ? bullata (Hall and Simpson).

Lichenalia ? calycula James. See Aspidopora calycula (James).

Lichenalia carinata Hall. Not recognized.

1883. Lichenalia carinata. Hall, Trans. Albany Institute, X, p. 151 (abstract, 1881, p. 9).
Hamilton: Falls of the Ohio.

Lichenalia circincta Hall. See Selenopora circincta (Hall).

Lichenalia (Selenopora) circincta Hall and Simpson. See Selenopora circincta (Hall).

Lichenalia clivulata Hall. See Eridopora ? clivulata (Hall).

Lichenalia (Pileotrypa) clivulata Hall. See Eridopora ? clivulata (Hall)

Lichenalia colliculata Hall. See Fistulipora colliculata (Hall).

Lichenalia (Selenopora) complexa Hall and Simpson. See Selenopora complexa (Hall).

Lichenalia complexata Hall. See Selenopora complexa (Hall).

Lichenalia concentrica Hall (in part) and other authors. See Fistulipora neglecta Rominger.

Lichenalia concentrica Hall.

1852. Lichenalia concentrica. Hall, Pal. New York, II, p. 171, pl. xl E, *5a–g*.
Niagara: Lockport, New York.
Obs. See remarks under the genus Lichenalia.

Lichenalia concentrica var. maculata Hall. See Fistulipora neglecta-maculata (Hall).

Lichenalia concentrica var. parvula Hall. See Fistulipora halli Rominger.

Lichenalia confusa Hall. See Fistulipora ? confusa (Hall).

Lichenalia constricta Hall. See Fistulipora ? constricta (Hall).

Lichenalia conulata Hall. See Fistulipora ? conulata (Hall).

Lichenalia cornuta Hall. See Fistulipora cornuta (Hall and Simpson).

Lichenalia crassa Hall. See Fistulipora ? crassa (Hall).

Lichenalia (Phractopora) cristata var. lineata Hall. See Phractopora cristata Hall.

Lichenalia crustacea Hall. Not recognized.

1883. Lichenalia crustacea. Hall, Trans. Albany Institute, X, p. 150 (abstract, 1881, p. 8).
Hamilton: Falls of the Ohio.

Lichenalia cultellata Hall. See Fistulipora cultellata (Hall).

Lichenalia denticulata Hall. See Eridopora denticulata (Hall).

Lichenalia (Pileotrypa) denticulata Hall. See Eridopora denticulata (Hall).

Lichenalia dissimilis Hall. See Paleschara ? dissimilis (Hall).

Lichenalia distans Hall. See Fistulipora distans (Hall).

Lichenalia distans Hall and Simpson (in error). See Fistulipora distensa (Hall).

Lichenalia distensa Hall. See Fistulipora distensa (Hall).

Lichenalia foliacea Hall. See Fistulipora foliacea (Hall).

Lichenalia geometrica Hall. See Fistulipora geometrica (Hall).

Lichenalia granifera Hall. See Fistulipora ? granifera (Hall).

Lichenalia (Pileotrypa) granifera Hall. See Fistulipora ? granifera (Hall).

Lichenalia (Ceramopora) imbricella Hall. See Ceramopora ? imbricella Hall.

Lichenalia interaspera Simpson. See Fistulipora interaspera Hall and Simpson.

Lichenalia longispina Hall. See Lichenotrypa longispina (Hall).

Lichenalia (Lichenotrypa) longispina Hall and Simpson. See Lichenotrypa longispina (Hall).

Lichenalia lunata Hall. See Buskopora dentata Ulrich.

Lichenalia lunata var. tubulata Hall. See Buskopora dentata (Ulrich).

Lichenalia maculosa Hall and Simpson. See Fistulipora maculosa (Hall).

Lichenalia operculata Hall and Simpson. See Pinacotrypa operculata (Hall and Simpson).

Lichenalia ovata Hall. See Fistulipora ovata (Hall).

Lichenalia paliformis Hall. See Glossotrypa paliformis (Hall).

Lichenalia (Glossotrypa) paliformis Hall. See Glossotrypa paliformis (Hall).

Lichenalia permarginata Hall. See Fistulipora? permarginata (Hall).

Lichenalia pustulosa Hall and Simpson. See Fistulipora? pustulosa (Hall and Simpson).

Lichenalia pyriformis Hall. See Buskopora pyriformis (Hall).

Lichenalia radiata Hall. Not recognized.

1883. Lichenalia radiata. Hall, Trans. Albany Institute, X, p. 152 (abstract, 1881, p. 10).
Upper Helderberg: Onondaga Valley, New York.

Lichenalia ramosa Hall. See Fistulipora ramosa (Hall).

Lichenalia serialis Hall. See Fistulipora serialis (Hall and Simpson).

Lichenalia stellata Hall. See Pinacotrypa stellata (Hall).

Lichenalia subcava Hall. See Fistulipora subcava (Hall).

Lichenalia substellata Hall. See Fistulipora substellata (Hall).

Lichenalia subtrigona Hall. See Fistulipora subtrigona (Hall).

Lichenalia tessellata Hall and Simpson. See Favicella tessellata (Hall and Simpson).

Lichenalia torta Hall. See Fistulipora torta (Hall) and Fistulipora serialis (Hall).

Lichenalia tortuosa (in error for torta) Hall. See Fistulipora serialis (Hall).

Lichenalia vesiculata Hall and Simpson. See Fistulipora vesiculata (Hall).

LICHENOTRYPA Ulrich. Genotype: Lichenotrypa cavernosa Ulrich = Lichenotrypa longispina (Hall).

1886. Lichenotrypa. Ulrich, Contr. American Pal., I, p. 23.

LICHENOTRYPA Ulrich—Continued.

1887. Lichenotrypa. Hall and Simpson, Pal. New York, VI, p. xvii.
1889. Lichenotrypa. Miller, North American Geol. Pal., p. 312.
1890. Lichenotrypa. Ulrich, Geol. Sur. Illinois, VIII, p. 383.
1896. Lichenotrypa. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 270.
1897. Lichenotrypa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 556.

Lichenotrypa aspera (in error for cavernosa) Ulrich. See Lichenotrypa longispina (Hall).

Lichenotrypa cavernosa Ulrich. See Lichenotrypa longispina (Hall).

Lichenotrypa longispina (Hall).

1883. Lichenalia longispina. Hall, Trans. Albany Institute, X, p. 153 (abstract, 1881, p. 11).
1886. Lichenotrypa longispina. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxv, 11, 12.
1887. Lichenalia (Lichenotrypa) longispina. Hall and Simpson, Pal. New York, VI, p. 287, pl. xxv, 11, 12.
1897. Lichenotrypa longispina. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxiii, 7.
1886. Lichenotrypa cavernosa. Ulrich, Contr. American Pal., I, p. 24, pl. ii, 7. (In explanation of plate ii called Lichenotrypa aspera in error.)
Hamilton: Falls of the Ohio.

Limaria Steininger. Not a bryozoan genus.

Limaria falcata Prout. Probably a bryozoan, but not recognizable.

1859. Limaria falcata. Prout, Trans. St. Louis Acad. Sci., I, p. 446, pl. xviii, 1-1c.
Devonian: Falls of the Ohio.

LIOCLEMA Ulrich. Genotype: Callopora punctata Hall.

1882. Leioclema. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, pp. 141, 154.
1889. Leioclema. Miller, North American Geol. Pal., p. 310.
1890. Leioclema. Ulrich, Geol. Sur. Illinois, VIII, pp. 376, 425.

Lioclema ? araneum Ulrich.

1890. Leioclema ? araneum. Ulrich, Geol. Sur. Illinois, VIII, p. 431, pl. lxxv, 9-9c.
1894. Leioclema araneum. Keyes, Missouri Geol. Sur., V, p. 14.
Chester: Chester, and Monroe County, Illinois; Pulaski and Jackson counties, Kentucky.

Lioclema asperum (Hall).

1852. Callopora aspera. Hall, Pal. New York, II, p. 147, pl. xl, *4a-i*.
1890. Leioclema asperum. Ulrich, Geol. Sur. Illinois, VIII, pp. 416, 425.
Niagara: Lockport, New York.

Lioclema cellulosum (Hall).

1879. Callopora cellulosa. Hall, Thirty-second Ann. Rep. New York State Museum, p. 154 (reprint, 1880, p. 16).
1883. Callopora cellulosa. Hall, Rep. State Geologist New York for the year 1882, pl. xii, 7-9, pl. xiii, 9.
1887. Callopora cellulosa. Hall and Simpson, Pal. New York, VI, p. 21, pl. xii, 1-9, pl. xiii, 9, pl. xxiii A, 6.
1890. Leioclema cellulosum. Ulrich, Geol. Sur. Illinois, VIII, p. 425.
1879. Callopora fistulosa. Hall, Thirty-second Ann. Rep. New York State Museum, p. 154 (reprint, 1880, p. 16).

Lioclema cellulosum (Hall)—Continued.

1883. Callopora fistulosa. Hall, Rep. State Geologist New York for the year 1882, pl. xii, 1–6.
Lower Helderberg: Clarksville, New York.

Lioclema confertiporum (Hall).

1883. Thallostigma confertipora. Hall, Trans. Albany Institute, X, p. 184 (abstract, 1881, p. 184).
1884. Thallostigma confertipora. Hall, Rep. State Geologist New York for the year 1883, p. 19.
1887. Fistulipora confertipora. Hall and Simpson, Pal. New York, VI, p. 211, pl. lviii, 1–5.
1897. Fistuliporina confertipora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxi, 13.
Hamilton: Moscow, New York.
Obs. See note on Lioclema minutum (Rominger).

Lioclema decipiens (Hall).

1883. Thallostigma decipiens. Hall, Trans. Albany Institute, X, p. 187 (abstract, 1881, p. 187).
1884. Thallostigma decipiens. Hall, Rep. State Geologist New York for the year 1883, p. 29.
1887. Fistulipora decipiens. Hall and Simpson, Pal. New York, VI, p. 232, pl. lix, 9.
Hamilton: York, New York.
Obs. See note on Lioclema minutum (Rominger).

Lioclema densum (Hall).

1883. Thallostigma densa. Hall, Trans. Albany Institute, X, p. 186 (abstract, 1881, p. 186).
1884. Thallostigma densa. Hall, Rep. State Geologist New York for the year 1883, p. 25.
1887. Fistulipora densa. Hall and Simpson, Pal. New York, VI, p. 231.
Hamilton: York, New York.
Obs. See note on Lioclema minutum (Rominger).

Lioclema digitatum (Hall).

1883. Thallostigma digitata. Hall, Trans. Albany Institute, X, p. 185 (abstract, 1881, p. 185).
1884. Thallostigma digitata. Hall, Rep. State Geologist New York for the year 1883, p. 24.
1887. Fistulipora digitata. Hall and Simpson, Pal. New York, VI, p. 229, pl. lix, 12, 13.
1897. Fistuliporina digitata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxi, 11.
1899. Fistuliporina digitata. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 170, fig. 65.
Hamilton: Hamburg, Erie County, New York.
Obs. See note on Lioclema minutum (Rominger).

Lioclema ? exsul (Hall).

1876. Alveolites exsul. Hall, Twenty-eighth Ann. Rep. New York State Museum (documentary edition), pl. ix, 3, 4.
1879. Callopora exsul. Hall, Twenty-eighth Ann. Rep. New York State Museum (Museum edition), p. 115, pl. ix, 3, 4.
1882. Callopora exsul. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 238, pl. viii, 3, 4.
1889. Callopora ? exsul. Miller, North American Geol. Pal., fig. 463 (p. 295).
Niagara: Waldron, Indiana.

Lioclema (? Nicholsonella) floridum (Hall).

1852. Callopora florida. Hall, Pal. New York, II, p. 146, pl. xl, 2*a–f*.
1890. Leioclema florida. Ulrich, Geol. Sur. Illinois, VIII, pp. 416, 425.
Niagara: Lockport, New York.

Lioclema foliatum Ulrich.

1889. Leioclema foliatum. (Ulrich, in press), Miller, North American Geol. Pal., fig. 491 (p. 311).
1890. Leioclema foliatum. Ulrich, Geol. Sur. Illinois, VIII, p. 431, fig. 1.
1894. Leioclema foliatum. Keyes, Missouri Geol. Sur., V, p. 14.
1896. Lioclema foliata. Ulrich, Zittel's Textb. Pal. (Engl. ed.), fig. 465 (p. 277).
Warsaw: Warsaw, Illinois.

Lioclema gracillimum Ulrich.

1888. Leioclema gracillimum. Ulrich, Bull. Denison Univ., IV, p. 92. (Not described.)
1890. Leioclema gracillimum. Ulrich, Geol. Sur. Illinois, VIII, p. 429, pl. lxxv, 6–6*b*.
1894. Leioclema gracillimum. Keyes, Missouri Geol. Sur., V, p. 13.
Kinderhook: Marshalltown, Iowa.
Burlington: Burlington, Iowa.
Keokuk: Keokuk, Iowa, and other localities.
Warsaw: Warsaw, Illinois.
Waverly: Lodi, Ohio.

Lioclema intercellatum (Hall).

1883. Thallostigma intercellata. Hall, Trans. Albany Institute, X, p. 154 (abstract, 1881, p. 13).
1886. Fistulipora intercellata. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxxii, 15–20.
1887. Fistulipora intercellata. Hall and Simpson, Pal. New York, VI, p. 87, pl. xxxii, 15–20.
Hamilton: Falls of the Ohio.
Obs. See note on Lioclema minutum (Rominger).

Lioclema involvens (Hall and Simpson).

1887. Fistulipora involvens. Hall and Simpson, Pal. New York, VI, p. 221, pl. lix, 2.
Hamilton: Near Alden Station, New York.
Obs. See note on Lioclema minutum (Rominger).

Lioclema (? Nicholsonella) laminatum (Hall).

1852. Callopora laminata. Hall, Pal. New York, II, p. 146, pl. xl, 3*a–e*.
1890. Leioclema ? laminatum. Ulrich, Geol. Sur. Illinois, VIII, pp. 416, 425.
Niagara: Lockport, New York.

Lioclema microporum (Hall).

1883. Thallostigma micropora. Hall, Trans. Albany Institute, X, p. 186 (abstract, 1881, p. 186).
1884. Thallostigma micropora. Hall, Rep. State Geologist New York for the year 1883, p. 26.
1887. Fistulipora micropora. Hall and Simpson, Pal. New York, VI, p. 220, pl. lvii, 20, pl. lix, 3.
1897. Fistuliporina micropora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxi, 6–8.
1899. Fistuliporina micropora. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 169, fig. 63.
Hamilton: Eighteenmile Creek, Erie County, New York.
Obs. See note on Lioclema minutum (Rominger).

Lioclema minutissimum (Nicholson).

1875. Callopora minutissima. Nicholson, Pal. Province Ontario, p. 77, fig. 43.
1898. Leioclema minutissimum. Whiteaves, Contr. Canadian Pal., I, p. 380.
Hamilton: Arkona, Ontario.
Obs. See note on Lioclema minutum (Rominger).

Lioclema minutum (Rominger).

1866. Fistulipora minuta. Rominger, Proc. Acad. Nat. Sci. Philadelphia, p. 120.
1887. Fistulipora minuta (?). Hall and Simpson, Pal. New York, VI, p. 223, pl. lix, 5–8.
1890. Leioclema minutum. Ulrich, Geol. Sur. Illinois, VIII, p. 427.
1899. Fistuliporina minuta. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 169, fig. 64.
1883. Thallostigma striata. Hall, Trans. Albany Institute, X, p. 186 (abstract, 1881, p. 186).
1884. Thallostigma striata. Hall, Rep. State Geologist New York for the year 1884, p. 28.
Hamilton: Near Alpena, Michigan; Buffalo and Davenport, Iowa; Andalusia and Rock Island, Illinois; Erie County, Delphi, and West Hamburg, New York.
Obs. We believe the following species to be closely related to, if not identical with, this species: Lioclema confertiporum, decipiens, digitatum, intercellatum, involvens, microporum, minutissimum, multaculeatum, punctillatum, segregatum, and subtile. However, before they are placed as actual synonyms, the types, if accessible, or specimens from the typical localities, must be studied.

Lioclema multaculeatum (Hall).

1884. Thallostigma multaculeata. Hall, Rep. State Geologist New York for the year 1883, p. 23.
1887. Fistulipora multaculeata. Hall and Simpson, Pal. New York, VI, p. 228, pl. lix, 10, 11.
1897. Fistuliporina multiculeata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxi, 12.
Hamilton: Darien Center, New York.
Obs. See note on Lioclema minutum (Rominger).

Lioclema occidens (Hall and Whitfield).

1873. Fistulipora occidens. Hall and Whitfield, Twenty-third Ann. Rep. New York State Museum, p. 228, pl. x, 9, 10.
1890. Leioclema occidens. Ulrich, Geol. Sur. Illinois, VIII, p. 426.
1878. Callopora cincinnatiensis. Ulrich, Jour. Cincinnati Soc. Nat. Hist., I, p. 93, pl. iv, 8, 8*a*.
1882. Callopora cincinnatiensis. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 142, pl. vi, 18, 18*a*.
Hamilton: Hackberry, Rockford, Independence, and Buffalo, Iowa; Rock Island, Illinois; Calloway County, Missouri.

Lioclema parasiticum (Hall).

1879. Callopora parasitica (in part). Hall, Thirty-second Ann. Rep. New York State Museum, p. 157 (reprint, 1880, p. 19).
1883. Callopora parasitica. Hall, Rep. State Geologist New York for the year 1882, pl. xiv, 13–18.
1887. Fistulipora parasitica. Hall and Simpson, Pal. New York, VI, p. 28, pl. xiv, 13, 14, pl. xxiii, 4.

Lioclema parasiticum (Hall)—Continued.

1890. Leioclema parasiticum. Ulrich, Geol. Sur. Illinois, VIII, p. 425.
Lower Helderberg: Clarksville, New York.

Lioclema ponderosum (Hall).

1874. Callopora ponderosa. Hall, Twenty-sixth Ann. Rep. New York State Museum, p. 103.
1879. Callopora ponderosa. Hall, Thirty-second Ann. Rep. New York State Museum, p. 156 (reprint, 1880, p. 18).
1883. Callopora ponderosa. Hall, Rep. State Geologist New York for the year 1882, pl. xiv, 9–12.
1887. Fistulipora ponderosa. Hall and Simpson, Pal. New York, VI, p. 27, pl. xiv, 9–12, pl. xxiiiA, 8–10.
1890. Leioclema ponderosum. Ulrich, Geol. Sur. Illinois, VIII, p. 425.
1897. Fistuliporina ponderosa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxi, 14.
Lower Helderberg: Schoharie, New York.

Lioclema punctatum (Hall).

1858. Callopora punctata. Hall, Geol. Iowa, I, Part 2, p. 653.
1882. Leioclema punctata. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 141, pl. vi, 1, 1*a*.
1888. Leioclema punctatum. Ulrich, Bull. Denison Univ., IV, p. 91.
1890. Leioclema punctatum. Ulrich, Geol. Sur. Illinois, VIII, p. 430.
1894. Leioclema punctatum. Keyes, Missouri Geol. Sur., V, p. 13.
1866. Callopora missouriensis. Rominger, Proc. Acad. Nat. Sci. Philadelphia, p. 117.
Keokuk: Keokuk, Iowa; Kings Mountain, Kentucky; Lagrange, Missouri.
Warsaw: Warsaw and Columbia, Illinois.
Waverly: Cuyahoga Valley, Ohio.

Lioclema punctillatum (Winchell).

1866. Callopora punctillata. Winchell, Rep. Lower Peninsula Michigan, p. 88.
Hamilton: Petoskey, Michigan.
Obs. See note on Lioclema minutum (Rominger).

Lioclema segregatum (Hall).

1883. Thallostigma segregata. Hall, Trans. Albany Institute, X, p. 186 (abstract, 1881, p. 186).
1884. Thallostigma segregata. Hall, Rep. State Geologist New York for the year 1883, p. 27.
1887. Fistulipora segregata. Hall and Simpson, Pal. New York, VI, p. 219, pl. lix, 4.
1899. Fistuliporina segregata. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 168, fig. 62.
Hamilton: Eighteenmile Creek, New York.
Obs. See note on Lioclema minutum (Rominger).

Lioclema spheroideum (Hall).

1883. Thallostigma spheroidea. Hall, Trans. Albany Institute, X, p. 187 (abstract, 1881, p. 187).
1884. Thallostigma spheroidea. Hall, Rep. State Geologist New York for the year 1883, p. 31.
1887. Fistulipora spheroidea. Hall and Simpson, Pal. New York, VI, p. 225, pl. lvii, 3, 4.
Hamilton: York, New York.

Lioclema subglobosum Ulrich.

1890. Leioclema subglobosum. Ulrich, Geol. Sur. Illinois, VIII, p. 428, pl. lxxv, 8–8*b*.

Kinderhook: Marshalltown, Iowa.

Lioclema subtile (Hall).

1883. Thallostigma subtilis. Hall, Trans. Albany Institute, X, p. 187 (abstract, 1881, p. 187).

1884. Thallostigma subtilis. Hall, Rep. State Geologist New York for the year 1883, p. 30.

1887. Fistulipora ? subtilis. Hall and Simpson, Pal. New York, VI, p. 233.

1898. Fistulipora ? subtilis. Whiteaves, Contr. Canadian Pal., I, p. 380.

Hamilton: West Williams, Ontario.

Obs. See note on Lioclema minutum (Rominger).

Lioclema wachsmuthi Ulrich.

1890. Leioclema wachsmuthi Ulrich. Geol. Sur. Illinois, VIII, p. 428, pl. lxxv, 7–7*b*.

Kinderhook: Marshalltown, Iowa.

Lioclema ? wilmingtonense Ulrich.

1890. Leioclema wilmingtonense. Ulrich, Geol. Sur. Illinois, VIII, p. 426, pl. xxxiv, 4–4*b*.

1895. Monticulipora wilmingtonense. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 76.

Cincinnati (Richmond): Wilmington, Illinois.

LIOCLEMELLA Foerste. Genotype: Callopora ohioensis Foerste.

1895. Lioclemella. Foerste, Geol. Sur. Ohio, VII, p. 600.

Lioclemella annulifera (Whitfield).

1878. Trematopora annulifer. Whitfield, Ann. Rep. Geol. Sur. Wisconsin for the year 1877, p. 67.

1882. Trematopora annulifer. Whitfield, Geol. Sur. Wisconsin, IV, p. 254, pl. xi, 15–17.

1882. Batostomella annulifera. Ulrich, Jour. Cincinnati Soc. Nat Hist., V, p. 141.

1895. Lioclemella annulifera. (Ulrich) Foerste, Geol. Sur. Ohio, VII, p. 600.

Cincinnati (Richmond): Delafield and Iron Ridge, Wisconsin; Eaton, Ohio.

Lioclemella fusiformis (Whitfield).

1878. Chætetes fusiformis. Whitfield, Ann. Rep. Geol. Sur. Wisconsin for the year 1877, p. 70.

1882. Chætetes fusiformis. Whitfield, Geol. Sur. Wisconsin, IV, p. 248, pl. xi, 13, 14.

1895. Lioclemella fusiformis. (Ulrich) Foerste, Geol. Sur. Ohio, VII, p. 600.

Cincinnati (Richmond): Iron Ridge, Wisconsin.

Lioclemella nitida (Ulrich).

1890. Trematopora ? nitida. Ulrich, Geol. Sur. Illinois, VIII, p. 419, pl. xxxiv, 2–2*f*.

1895. Lioclemella nitida. (Ulrich) Foerste, Geol. Sur. Ohio, VII, p. 600.

Cincinnati (Richmond): Savannah, Illinois.

Lioclemella ohioensis (Foerste).

1887. Callopora ohioensis. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 174; ibid., III, 1888, pl. xvi, 6.

1895. Lioclemella ohioensis. Foerste, Geol. Sur. Ohio VII, p. 600, pl. xxix, 6.

Clinton: Dayton and Centerville, Ohio.

Lioclemella solidissima (Whitfield).

1878. Fistulipora solidissima. Whitfield, Ann. Rep. Geol. Sur. Wisconsin for the year 1877, p. 69.

1882. Fistulipora solidissima. Whitfield, Geol. Sur. Wisconsin, IV, p. 255, pl. xi, 18, 19.

Cincinnati (Richmond): Delafield and Iron Ridge, Wisconsin; Savannah, Illinois.

Lioclemella subfusiformis (James).

1882. Monticulipora (?Monotrypa) subfusiformis. James, Paleontologist, No. 6, p. 52; ibid., No. 7, 1883, pl. i, 1.

1888. Monticulipora fusiformis (not of Whitfield). James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 26.

1895. Monticulipora fusiformis, (not of Whitfield). J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 83.

Cincinnati (Richmond): Warren and Clinton counties, Ohio.

LOCULIPORA Hall. Genotype: Fenestella perforata Hall.

1885. Loculipora. Hall, Rep. State Geologist New York for the year 1884, p. 37.

1887. Loculipora. Hall and Simpson, Pal. New York, VI, p. xxiii.

1889. Loculipora. Miller, North American Geol. Pal., p. 312.

1895. Loculipora. Simpson, Thirteenth Ann. Rep. State Geologist New York for the year 1893, pp. 690, 716, 726; Forty-seventh Ann. Rep. New York State Museum, pp. 884, 910, 920.

1897. Loculipora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pp. 511, 520.

1899. Loculipora. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 160.

1888. Tectulipora. Hall, Seventh Ann. Rep. State Geologist New York for the year 1887, [p. 395]; Forty-first Ann. Rep. New York State Museum, [p. 395]. (Not defined).

1895. Tectulipora. Simpson, Thirteenth Ann. Rep. State Geologist New York for the year 1893, pp. 690, 715, 726; Forty-seventh Ann. Rep. New York State Museum, pp. 884, 909, 920.

1897. Tectulipora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pp. 511, 520.

Obs. Sections of Loculipora perforata show that the nonporiferous dissepiments are reduced to a minimum, the branches coming close together (anastomosing); but it is not correct to say that the dissepiments are celluliferous. The structure is in all essential respects precisely as in the species loculata, the type of Tectulipora.

Loculipora ambigua (Hall).

1876. Hemitrypa dubia. Hall, Twenty-eighth Ann. Rep. New York State Museum (documentary edition), pl. xi, 17–21.

1879. Fenestella ambigua. Hall, Twenty-eighth Ann. Rep. New York State Museum (Museum edition), p. 123, pl. xi, 17–21.

1882. Fenestella ambigua. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 248, pl. xi, 17–21.

1889. Loculipora ambigua. Miller, North American Geol. Pal., p. 312.

1890. Isotrypa ambigua. Ulrich, Geol. Sur. Illinois, VIII, p. 534.

Niagara: Waldron, Indiana.

Loculipora circumstata (Hall and Simpson).

1887. Fenestella (Loculipora) circumstata. Hall and Simpson, Pal. New York, VI, p. 144, pl. liv, 22–25.

Upper Helderberg: Walpole, Ontario.

Loculipora circumstata (Hall and Simpson)—Continued.

Obs. This form and that described as Loculipora perforata may prove to be the same species.

Loculipora loculata (Hall).

1888. Fenestella (Tectulipora) loculata. Hall, Seventh Ann. Rep. State Geologist New York for the year 1887 [p. 395]; Forty-first Ann. Rep. New York State Museum [p. 395].

1897. Tectulipora loculata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 60, 61 (p. 511), pl. vii, 1–5 (called Tectulipora biperforata on the explanation sheet).

1888. Fenestella parallela. Hall, Seventh Ann. Rep. State Geologist New York for the year 1887, pl. ix, 6–11; Forty-first Ann. Rep. New York State Museum, pl. ix, 6–11.

Lower Helderberg: Clarksville, New York.

Loculipora perforata (Hall).

1884. Fenestella perforata. Hall, Thirty-sixth Ann. Rep. New York State Museum, p. 65.

1885. Loculipora perforata. Hall, Rep. State Geologist New York for the year 1884, pl. ii, 15.

1887. Fenestella (Loculipora) perforata. Hall, Sixth Ann. Rep. State Geologist New York for the year 1886, p. 62.

1888. Fenestella (Loculipora) perforata. Hall, Seventh Ann. Rep. State Geologist New York for the year 1887, pl. x, 1–13; Forty-first Ann. Rep. New York State Museum, pl. x, 1–13.

1897. Loculipora perforata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. vii, 6–12.

1899. Loculipora perforata. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 160, fig. 49.

Hamilton: Darien and near Canandaigua Lake, New York.

LYROPORA Hall. Genotype: Fenestella (Lyropora) subquadrans Hall.

1857. Lyropora. Hall, Proc. American Assoc. Adv. Sci., X, p. 179.

1882. Lyropora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 150.

1883. Lyropora. Claypole, Quar. Jour. Geol. Soc. London, XXXIX, p. 32.

1885. Lyropora. Hall, Rep. State Geologist New York for the year 1884, p. 37.

1885. Lyropora. Waagen and Pichl, Pal. Indica, Ser. XIII, p. 773.

1886. Lyropora. Ulrich, Contr. American Pal., I, p. 5.

1889. Lyropora. Miller, North American Geol. Pal., p. 312.

1890. Lyropora. Ulrich, Geol. Sur. Illinois, VIII, pp. 396, 580.

1895. Lyropora. Simpson, Thirteenth Ann. Rep. State Geologist New York for the year 1893, pp. 689, 723, 726; Forty-seventh Ann. Rep. New York State Museum, pp. 883, 917, 920.

1896. Lyropora. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 282.

1897. Lyropora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pp. 515, 522.

1895. Lyroporella. Simpson, Thirteenth Ann. Rep. State Geologist New York for the year 1893, pp. 701, 724, 727; Forty-seventh Ann. Rep. New York State Museum, pp. 895, 918, 921.

1897. Lyroporella. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pp. 516, 522.

1895. Lyroporina. Simpson, Thirteenth Ann. Rep. State Geologist New York for the year 1893, pp. 723, 727; Forty-seventh Ann. Rep. New York State Museum, pp. 917, 921.

LYROPORA Hall—Continued.

1897. Lyroporina. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 522.

1897. Lyroporidra. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pp. 517, 522.

Obs. On page 701 of the Thirteenth Ann. Rep. State Geologist New York for the year 1893 Simpson proposes the name Lyroporella for species of Lyropora having but two ranges of cells on a branch throughout. On page 723 of the same work the name Lyroporina is proposed for the same group. No genotype is mentioned, nor do we know of any species having but two ranges of cells. This group is therefore apparently imaginary, and should strictly not have been placed above as a synonym of Lyropora. On page 724 a new genus Lyroporella is made for forms having two ranges of cells on the narrower portion of the branches and three or more on the wider portion.

In the Fourteenth Annual Report of the State Geologist of New York for the year 1894 Lyroporella is held for the two and three ranged forms, Lyroporina for the two ranged, and a new genus Lyroporidra is added. Six species and one variety of Lyropora have been described, and we know of no new forms. These species show that the only constant generic character is the thickened V or U shaped calcareous support. This at once shows the utter uselessness of Simpson's proposed names. The same carelessness and artificiality are exhibited in other cases. See synonymy under Ptiloporella, Ptiloporina, Fenestella, Polypora, etc.

Lyropora cinctura Hall. See Reteporidra cinctuta (Hall).

Lyropora divergens Ulrich.

1890. Lyropora divergens. Ulrich, Geol. Sur. Illinois, VIII, p. 584, pl. lviii, 4–4*b*, 4*d*.

1894. Lyropora divergens. Keyes, Missouri Geol. Sur., V, p. 28.

Chester: Chester, Illinois; Sloans Valley, Kentucky.

Lyropora ovalis Ulrich.

1890. Lyropora ovalis. Ulrich, Geol. Sur. Illinois, VIII, p. 585, pl. lviii, 5–5*b*; pl. lv, 8.

Chester: Grayson Springs and Litchfield, Kentucky.

Lyropora quincuncialis (Hall).

1857. Fenestella (Lyropora) quincuncialis. Hall, Proc. American Assoc. Adv. Sci., X, p. 180.

1890. Lyropora quincuncialis. Ulrich, Geol. Sur. Illinois, VIII, p. 583, pl. lviii, 3–3*d*, pl. lv, 7–7*c*.

1894. Lyropora quincuncialis. Keyes, Missouri Geol. Sur., V, p. 27.

1897. Lyroporella quincuncialis. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 69 (p. 516).

Chester: Chester, Illinois; Sloans Valley, Kentucky.

Lyropora ranosculum Ulrich.

1890. Lyropora ranosculum. Ulrich, Geol. Sur. Illinois, VIII, p. 581, pl. lviii, 1–1*c*.

1897. Lyropora ranosculum. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 66–68 (p. 515).

Chester: Chester and Kaskaskia, Illinois; Sloans Valley, Kentucky.

Lyropora retrorsa (Meek and Worthen).

1868. Fenestella (Lyropora) retrorsa. Meek and Worthen, Geol. Sur. Illinois, III, p. 504, pl. xv, 1.

Lyropora retrorsa (Meek and Worthen)—Continued.

1894. Lyropora retrorsa. Keyes, Missouri Geol. Sur., V, p. 27, pl. xxxiv, 4.
Burlington: Burlington, Iowa.

Lyropora subquadrans (Hall).

1857. Fenestella (Lyropora) subquadrans. Hall, Proc. American Assoc. Adv. Sci., X, p. 180.
1890. Lyropora subquadrans. Ulrich, Geol. Sur. Illinois, VIII, p. 582, pl. lviii, 2–2*e*.
1894. Lyropora subquadrans. Keyes, Missouri Geol. Sur., V, p. 27.
1897. Lyroporidra subquadrans. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. ix, 19.
Chester: Chester, Illinois; Sloans Valley, Kentucky.

Lyropora subquadrans-lyra (Hall).

1857. Fenestella (Lyropora) lyra. Hall, Proc. American Assoc. Adv. Sci., X, p. 179.
1890. Lyropora subquadrans var. lyra. Ulrich, Geol. Sur. Illinois, VIII, p. 583.
Chester: Kaskaskia and Chester, Illinois.

Lyroporella Simpson. See Lyropora Hall.

Lyroporella quincuncialis Simpson. See Lyropora quincuncialis (Hall).

Lyroporidra Simpson. See Lyropora Hall.

Lyroporidra subquadrans Simpson. See Lyropora subquadrans (Hall).

Lyroporina Simpson. See Lyropora Hall.

MEEKOPORA Ulrich. Genotype: Meekopora eximia Ulrich.

1890. Meekopora. Ulrich, Geol. Sur. Illinois, VIII, pp. 383, 482.
1889. Meekopora. (Ulrich, in press), Miller, North American Geol. Pal., p. 312.
1896. Meekopora. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 270.
1897. Meekapora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 538.

Meekopora ? aperta Ulrich.

1890. Meekopora ? aperta. Ulrich, Geol. Sur. Illinois, VIII, p. 485, pl. lxxvi, 1, 1*a*.
Keokuk: Kings Mountain, Kentucky.

Meekopora approximata Ulrich.

1890. Meekopora approximata. Ulrich, Geol. Sur. Illinois, VIII, p. 484, pl. lxxvii, 5.
1894. Meekopora approximata. Keyes, Missouri Geol. Sur., V, p. 16.
Chester: Chester, Illinois; Sloans Valley, Kentucky.

Meekopora clausa (Ulrich).

1884. Fistulipora ? clausa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, p. 47, pl. iii, 4–4*b*.
1889. Meekopora clausa. Miller, North American Geol. Pal., fig. 494 (p. 313).
1890. Meekopora clausa. Ulrich, Geol. Sur. Illinois, VIII, p. 485, pl. lxxvi, 6, pl. lxxvii, 7–7*b*, fig. 5*e* (p. 315).
1894. Meekopora clausa. Keyes, Missouri Geol. Sur., V, p. 17.
1897. Meekapora clausa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 94 (in part) (p. 538).
Chester: Sloans Valley and Grayson Springs, Kentucky; Chester, Illinois.

Meekopora eximia Ulrich.

1890. Meekopora eximia. Ulrich, Geol. Sur. Illinois, VIII, p. 483, pl. lxxvii, 6–6*d*.

Meekopora eximia Ulrich—Continued.

1896. Meekopora eximia. Ulrich, Zittel's Textb. Pal. (Engl. ed.), fig. 444 (p. 270).
1897. Meekopora eximia. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 94 (in part) (p. 538).
Ste. Genevieve: Pella, Iowa.
Chester: Monroe County, Illinois; Caldwell County, Kentucky.

Meekopora foliacea (Hall).

1852. Ceramopora foliacea. Hall, Pal. New York, II, p. 170, pl. xlE, 3*a–r*.
Niagara: Lockport, New York.

Meekopora stellifera (Rominger).

1866. Fistulipora stellifera. Rominger, Proc. Acad. Nat. Sci. Philadelphia, p. 120.
1890. Fistulipora stellifera. Ulrich, Geol. Sur. Illinois, VIII, p. 481, pl. xlvii, 2, 2*a*.
Hamilton: Near Alpena, Michigan.

MESOTRYPA Ulrich. Genotype: Diplotrypa infida Ulrich.

1879. Diplotrypa (in part). Nicholson, Paleozoic Tabulate Corals, p. 312.
1881. Diplotrypa (in part). Nicholson, Genus Monticulipora, pp. 101, 155.
1882. Diplotrypa (in part). Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 153.
1883. Diplotrypa (in part). Foord, Contr. Micro-Pal. Cambro-Sil., p. 13.
1890. Diplotrypa (in part). Ulrich, Geol. Sur. Illinois, VIII, p. 378.
1893. Mesotrypa. Ulrich, Geol. Minnesota, III, p. 257.

Mesotrypa discoidea Ulrich.

1893. Mesotrypa discoidea. Ulrich, Geol. Minnesota, III, p. 260, fig. 16.
Trenton: Goodhue County, Minnesota.

Mesotrypa infida (Ulrich).

1886. Diplotrypa infida. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Sur. Minnesota, p. 88.
1893. Mesotrypa infida. Ulrich, Geol. Minnesota, III, p. 258, pl. xvii, 1–8.
1896. Mesotrypa infida. Ulrich, Zittel's Textb. Pal. (Engl. ed.), fig. 453 (p. 273).
Trenton (Black River): Minneapolis, St. Paul, and Goodhue and Fillmore counties, Minnesota.

Mesotrypa milleri (Ulrich).

1882. Diplotrypa milleri. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 245, pl. xi, 2–2*c*.
Niagara: Osgood, Indiana.

Mesotrypa patella (Ulrich).

1890. Diplotrypa patella. Ulrich, Geol. Surv. Illinois, VIII, p. 458, pl. xxxiii, 2–2*c*.
1893. Mesotrypa patella. Ulrich, Geol. Minnesota, III, p. 257.
1894. Diplotrypa patella. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 184.
Cincinnati (Richmond): Oxford, Ohio; Richmond, Indiana.

Mesotrypa quebecensis (Ami).

1892. Diplotrypa Quebecensis. Ami, Canadian Record of Science, V, p. 101.
1893. Mesotrypa quebecensis. Ulrich, Geol. Minnesota, III, p. 259, fig. 15*e*, *f*.
Trenton: Quebec City, Quebec; Bridport, Vermont; Trenton Falls and Little Falls, New York; Frankfort, Burgin, and Danville, Kentucky; Decorah, Iowa.

Mesotrypa regularis (Foord).

1883. Diplotrypa regularis. Foord, Contr. Micro-Pal. Cambro-Sil., p. 13, pl. i, 3–3*c*.
1893. Mesotrypa regularis. Ulrich, Geol. Minnesota, III, p. 257.
Trenton: Ottawa City, Canada.

Mesotrypa ? rotunda Ulrich.

1893. Mesotrypa ? rotunda. Ulrich, Geol. Minnesota, III, p. 262, fig. 17.
Trenton: Hader, Minnesota.

Mesotrypa selkirkensis Whiteaves.

1897. Mesotrypa Selkirkensis. Whiteaves, Pal. Foss., III, p. 162, pl. xix, 1, 1*a*.
Trenton: East Selkirk, Canada.

Mesotrypa ? spinosa Ulrich.

1893. Mesotrypa ? spinosa. Ulrich, Geol. Minnesota, III, p. 259, pl. xvii, 9–12.
Trenton (Black River): Minneapolis and St. Paul, Minnesota.

Mesotrypa whiteavesi (Nicholson).

1875. Chætetes petropolitanus (in part). Nicholson, Quar. Jour. Geol. Soc. London, XXX, p. 510, pl. xxx, 5, 5*c*.
1875. Chætetes petropolitanus (in part). Nicholson, Pal. Ohio, II, p. 204, pl. xxi, 14–14*b*.
1875. Chætetes petropolitanus (in part). Nicholson, Geol. Mag., new ser., II, p. 175.
1876. Chætetes petropolitanus (in part). Nicholson, Ann. Mag. Nat. Hist., ser. 4, XVIII, p. 88, pl. v, 6*a* (not 6).
1879. Monticulipora (Diplotrypa) Whiteavesii. Nicholson, Paleozoic Tabulate Corals, p. 316, pl. xiii, 4–4*b* (not pl. xiv, 1).
1881. Monticulipora (Diplotrypa) Whiteavesii. Nicholson, Genus Monticulipora, p. 160, fig. 31.
1888. Monticulipora whiteavesii. James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 169.
1893. Mesotrypa whiteavesii. Ulrich, Geol. Minnesota, III, fig. 15*g*, *h*.
1894. Monticulipora whiteavesii. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 187.
Trenton: Peterboro', Ontario.

MITOCLEMA Ulrich. Genotype: Mitoclema cinctosum Ulrich.

1882. Mitoclema. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 150.
1890. Mitoclema. Ulrich, Geol. Surv. Illinois, VIII, pp. 336, 369.
1893. Mitoclema. Ulrich, Geol. Minnesota, III, p. 122.
1897. Mitoclema. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 598.

Mitoclema cinctosum Ulrich.

1882. Mitoclema cinctosum. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 159, pl. vi, 7, 7*a*.
1889. Enallopora cinctosa. Miller, North American Geol. Pal., p. 301.
1890. Mitoclema cinctosum. Ulrich, Geol. Sur. Illinois, VIII, pl. liii, 8–8*b*.
1897. Mitoclema cinctosum. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 205, 206 (p. 599).
Trenton (Stones River): High Bridge, Kentucky; Murfreesboro, Tennessee.

Mitoclema ? mundulum Ulrich.

1890. Mitoclema ? mundulum. Ulrich, Jour. Cincinnati Soc. Nat. Hist., XII, p. 177, fig. 4*a*–*c*.
1893. Mitoclema ? mundulum. Ulrich, Geol. Minnesota, III, p. 123, pl. ii, 4–8.
Trenton: Cannon Falls, Minnesota.

MONOTRYPA Nicholson. Genotype: Chætetes **undulatus** Nicholson.

1879. Monotrypa. Nicholson, Paleozoic Tabulate Corals, p. 293.
1881. Monotrypa. Nicholson, Genus Monticulipora, pp. 102, 168.
1882. Monotrypa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 153.
1883. Monotrypa. Foord, Contr. Micro-Pal. Cambro-Sil., p. 14.
1886. Monotrypa. Waagen and Wentzel, Pal. Indica, Ser. XIII, 875, 876.
1887. Monotrypa. Hall and Simpson, Pal. New York, VI, p. xiii.
1889. Monotrypa. Miller, North American Geol. Pal., p. 196.
1890. Monotrypa. Ulrich, Geol. Surv. Illinois, VIII, p. 379.
1893. Monotrypa. Ulrich, Geol. Minnesota, III, p. 303.
1896. Monotrypa (in part). Zittel's Textb. Pal. (Engl. ed.), p. 104.
1897. Monotrypa. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 275.
1897. Monotrypa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 581.
1899. Monotrypa. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 136.
1887. Ptychonema. Hall and Simpson, Pal. New York, VI, pp. xiv, 14.
1889. Ptychonema. Miller, North American Geol. Pal., p. 201.
1897. Ptychonema. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 583.

Monotrypa ? amplectens Grabau.

1899. Monotrypa amplectens. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 137, fig. 22.
Hamilton: Averys Creek, Erie County, New York.

Monotrypa colliculata (Hall).

1879. Chætetes colliculatus. Hall, Thirty-second Ann. Rep. New York State Museum, p. 148 (reprint, 1880, p. 10).
1883. Chætetes colliculatus. Hall, Rep. State Geologist New York for the year 1882, pl. viii, 1–4.
1887. Chætetes colliculatus. Hall and Simpson, Pal. New York, VI, p. 11, pl. viii, 1–4.
1893. Monotrypa colliculata. Ulrich, Geol. Minnesota, III, p. 304.
Lower Helderberg: Schoharie, New York.

Monotrypa (Chætetes ?) cumulata Ulrich.

1893. Monotrypa (Chætetes ?) cumulata. Ulrich, Geol. Minnesota, III, p. 307, pl. xxvii, 26, 27.
Trenton: Goodhue County, Minnesota; Ottawa, Canada.

Monotrypa ? filiasa Ulrich. See Amplexopora filiosa (D'Orbigny).

Monotrypa fruticosa Grabau. See Chætetes fruticosus Hall (Hamilton).

Monotrypa ? furcata Grabau. See Chætetes furcatus Hall.

Monotrypa ? helderbergiæ (Hall).

1874. Chætetes Helderbergiæ. Hall, Twenty-sixth Ann. Rep. New York State Museum, p. 110.
1883. Chætetes Helderbergiæ. Hall, Rep. State Geologist New York for the year 1882, pl. ix 16, 17.
1887. Ptychonema Helderbergiæ. Hall and Simpson, Pal. New York, VI, p. 15, pl. ix, 16, 17.
1879. Favosites inexpectans. Hall, Thirty-second Ann. Rep. New York State Museum, p. 146 (reprint, 1880, p. 8).
Lower Helderberg: Clarksville and Schoharie, New York.

Monotrypa incerta. Ami. Not recognizable.

1892. Monotrypa incerta. Ami, Canadian Record of Science, V, p. 101.
Trenton: Quebec City, Quebec.

Monotrypa intabulata Ulrich.

1893. Monotrypa intabulata. Ulrich, Geol. Minnesota, III, p. 305, fig. 20.
Trenton: Goodhue and Fillmore counties, Minnesota.

Monotrypa irregularis Ulrich. See Leptotrypa ? irregularis (Ulrich).

Monotrypa magna Ulrich.

1893. Monotrypa magna. Ulrich, Geol. Minnesota, III, pl. 304, p. xxvii, 28, 29.
Trenton (Stones River): Dixon, Illinois; Mineral Point and Beloit, Wisconsin.

Monotrypa monticulata (Hall).

1879. Chætetes monticulatus. Hall, Thirty-second Ann. Rep. New York State Museum, p. 148 (reprint, 1880, p. 10).
1882. Monotrypa monticulata. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 256.
1883. Chætetes monticulatus. Hall, Rep. State Geologist New York for the year 1882, pl. viii, 5–7.
1887. Chætetes monticulatus. Hall and Simpson, Pal. New York, VI, p. 12, pl. viii, 5–7.
Lower Helderberg: Schoharie, New York.

Monotrypa nodosa Ulrich.

1882. Monticulipora ? Ortoni (not of Nicholson). Whitfield, Geol. Sur. Wisconsin, IV, p. 251, pl. xi, 7, 8.
1893. Monotrypa nodosa. Ulrich, Geol. Minnesota, III, p. 306.
Cincinnati (Richmond): Iron Ridge and Delafield, Wisconsin; Savannah, Illinois.

Monotrypa petasiformis Ulrich. See Amplexopora petasiformis (Nicholson).

Monotrypa ? proxima (Hall).

1879. Favosites proximus. Hall, Thirty-second Ann. Rep. New York State Museum, p. 147 (reprint, 1880, p. 9).
1883. Favosites proximus. Hall, Rep. State Geologist New York for the year 1882, pl. vii, 13–15.
1887. Favosites proximus. Hall and Simpson, Pal. New York, VI, p. 10, pl. vii, 13–15.
Lower Helderberg: Schoharie, New York.

Monotrypa rectimuralis Ulrich.

1890. Monotrypa rectimuralis. Ulrich, Geol. Sur. Illinois, VIII, p. 462, fig. 3*a* (p. 308), fig. 4*d* (p. 309), pl. xxxviii, 1–1*b*.
1896. Monotrypa rectimuralis. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 124.
1897. Monotrypa rectimuralis. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 151–153 (p. 581).
Trenton: Alexander County, Illinois.

Monotrypa sphærica (Hall).

1874. Chætetes spherica. Hall, Twenty-sixth Ann. Rep. New York State Museum, p. 111.
1883. Favosites sphericus. Hall, Rep. State Geologist New York for the year 1882, pl. vii, 1–12.

Monotrypa sphærica (Hall)—Continued.

1887. Favosites sphæricus. Hall and Simpson, Pal. New York, VI, p. 9, pl. vii, 1–12, pl. viii, 8.
1879. Favosites minimus. Hall, Thirty-second Ann. Rep. New York State Museum, p. 147 (reprint, 1880, p. 9).
Lower Helderberg: Clarksville, New York.

Monotrypa ? spinosula Hall and Simpson. See **Monotrypa** ?? spinulosa Hall and Simpson.

Monotrypa ?? spinulosa Hall and Simpson.

1883. Species undetermined. Hall, Rep. State Geologist New York for the year 1882, pl. xvi, 25.
1887. Monotrypa ? spinosula (in error for spinulosa). Hall and Simpson, Pal. New York, VI, p. 67, pl. xvi, 25.
Lower Helderberg: Schoharie, New York.

Monotrypa subglobosa Ulrich. See Monotrypa turbinata (James).

Monotrypa tabulata (Hall).

1876. Chætetes tabulatus. Hall, Illus. Devonian Foss., pl. xxxvii, 16, 19.
1879. Chætetes tabulatus. Hall, Thirty-second Ann. Rep. New York State Museum, p. 149 (reprint, 1880, p. 11).
1883. Chætetes ? tabulatus. Hall, Rep. State Geologist New York for the year 1882, pl. ix, 12–15.
1887. Chætetes (Ptychonema) tabulatus. Hall and Simpson, Pal. New York, VI, p. 14, pl. ix, 12–15.
1889. Ptychonema tabulatum. Miller, North American Geol. Pal., p. 201.
1893. Monotrypa tabulata. Ulrich, Geol. Minnesota, III, p. 304.
1897. Ptychonema tabulatum. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xvii, 9.
Lower Helderberg: Schoharie, New York.

Monotrypa turbinata (James).

1878. Chætetes turbinatum. James, Paleontologist, No. 2, p. 11.
1888. Monticulipora turbinata. James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 161, pl. ii, 1*a–c*.
1893. Monticulipora turbinata. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XV, p. 158.
1879. Chætetes subglobosa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., II, p. 129, pl. xii, 11–11*b*.
1882. Monotrypa subglobosa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 256.
Cincinnati (Utica): Cincinnati, Ohio, and vicinity.

Monotrypa undulata (Nicholson).

1875. Chætetes undulatus. Nicholson, Geol. Mag., new ser., II, p. 176.
1875. Chætetes undulatus. Nicholson, Pal. Province Ontario, pp. 10, 33, pl. iv, 1.
1879. Monticulipora (Monotrypa) undulata. Nicholson, Paleozoic Tabulate Corals, p. 321, pl. xiv, 3–3*b*, 4, 4*a*.
1881. Monticulipora (Monotrypa) undulata. Nicholson, Genus Monticulipora, p. 170, fig. 32 (not fig. 33 = M. undulata-hemispherica (J. F. James)).
1882. Monotrypa undulata. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 256.
1888. Monticulipora undulata. James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 161.
1893. Monticulipora undulata. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XV, p. 157.
Trenton: Belleville and Peterboro, Ontario.

Monotrypa undulata-hemispherica (J. F. James).
1881. Monticulipora (Monotrypa) undulata (in part). Nicholson, Genus Monticulipora, p. 170, fig. 33, *A–C*.
1893. Monticulipora undulata var. hemispherica. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XV, p. 157, fig. 10*a–c*.
Cincinnati (Richmond ?): Toronto and Weston, Ontario.

MONOTRYPELLA Ulrich. Genotype: Monotrypella æqualis Ulrich.
1882. Monotrypella. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 153.
1883. Monotrypella. Foord, Contr. Micro-Pal. Cambro-Sil., p. 15.
1887. Monotrypella. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 171.
1887. Monotrypella. Hall and Simpson, Pal. New York, VI, p. xiii.
1889. Monotrypella. Miller, North American Geol. Pal., p. 196.
1890. Monotrypella. Ulrich, Geol. Sur. Illinois, VIII, pp. 377, 451.
1896. Monotrypella. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 278.
1897. Monotrypella. Simpson, Fourteenth Ann. Rep. State Geologist New York, for the year 1894, p. 581.

Monotrypella ? abrupta (Hall).
1879. Chætetes abruptus. Hall, Thirty-second Ann. Rep. New York State Museum, p. 148 (reprint, 1880, p. 10).
1883. Chætetes abruptus. Hall, Rep. State Geologist New York, for the year 1882, pl. ix, 9–11.
1887. Chætetes (Monotrypella) abruptus. Hall and Simpson, Pal. New York, VI, p. 13, pl. ix, 9–11.
Lower Helderberg: Schoharie, New York.

Monotrypella æqualis Ulrich.
1882. Monotrypella æqualis. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 247, pl. xi, 3–3*b*.
1890. Monotrypella æqualis. Ulrich, Geol. Sur. Illinois, VIII, fig. 3*b* (p. 308), fig. 4*a* (p. 309).
1894. Monticulipora æqualis. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 201.
1897. Monotrypella æqualis. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 154–156 (p. 582).
Cincinnati (Utica): Covington, Kentucky.

Monotrypella appressa Ulrich. See Eridotrypa appressa (Ulrich).

Monotrypella ? arbuscula (Hall).
1879. Chætetes fruticosus. Hall, Thirty-second Ann. Rep. New York State Museum, p. 148 (reprint, 1880, p. 10).
1883. Chætetes fruticosus. Hall, Rep. State Geologist New York, for the year 1882, pl. ix, 1–8.
1887. Chætetes (Monotrypella) arbusculus. Hall and Simpson, Pal. New York, VI, p. 12, pl. ix, 1–3 (? 4, 5), 6–8.
Lower Helderberg: Schoharie, New York.

Monotrypella briarea Ulrich. See Eridotrypa briareus (Nicholson).

Monotrypella confluens Foerste. See Homotrypa confluens (Foerste).

Monotrypella ? consimilis (Hall).
1876. Chætetes ? consimilis. Hall, Twenty-eighth Ann. Rep. New York State Mus. (documentary edition), pl. ix, 7–14.
1879. Chætetes consimilis. Hall, Twenty-eighth Ann. Rep. New York State Museum (Museum edition), p. 110, pl. ix, 7–14.

Monotrypella ? consimilis (Hall)—Continued.

1882. Chætetes consimilis. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 230, pl. viii, 7–14.
1882. Monotrypella consimilis. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 248.
Niagara: Waldron, Indiana.

Monotrypella crassimuralis Ulrich.

1890. Monotrypella crassimuralis. Ulrich, Geol. Sur. Illinois, VIII, p. 452, pl. xxxviii, 2–2*f*.
1894. Monticulipora crassimuralis. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 208.
Cincinnati (Richmond): Wilmington, Illinois.

Monotrypella ? densa (Hall).

1874. Trematopora densa. Hall, Twenty-sixth Ann. Rep. New York State Museum, p. 105.
1879. Trematopora (Chætetes) densa. Hall, Thirty-second Ann. Rep. New York State Museum, p. 150 (reprint, 1880, p. 12).
1883. Trematopora (Chætetes) densa. Hall, Rep. State Geologist New York, for the year 1882, pl. x, 11–13.
1887. Chætetes (Monotrypella) densus. Hall and Simpson, Pal. New York, VI, p. 14, pl. x, 11–13.
Lower Helderberg: Catskill Creek and Schoharie, New York.
Obs. This species may belong to the genus Eridotrypa.

Monotrypella multitabulata Ulrich. See Callopora multitabulata (Ulrich).

Monotrypella quadrata (Rominger).

1866. Chætetes quadratus. Rominger, Proc. Acad. Nat. Sci. Philadelphia, p. 116.
1881. Monticulipora (Monotrypa) quadrata. Nicholson, Genus Monticulipora, p. 179, fig. 36.
1882. Monotrypella quadrata. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 248.
1888. Monticulipora quadrata. James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 176.
1889. Monotrypella quadrata. Ulrich, Contr. Micro-Pal. Cambro-Sil., Part II, p. 36.
1894. Monticulipora quadrata. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 198.
1895. Monotrypella quadrata. Whiteaves, Pal. Foss., III, p. 116.
1874. Chætetes rhombicus. Nicholson, Quar. Jour. Geol. Soc. London, XXX, p. 507, pl. xxix, 11–11*b*.
1875. Chætetes rhombicus. Nicholson, Pal. Ohio, II, p. 201, pl. xxi, 12, 12*a*.
1876. Chætetes rhombicus. Nicholson, Ann. Mag. Nat. Hist., ser. 4, XVIII, p. 86, pl. v, 1–1*b*.
1878. Monticulipora rectangularis. Whitfield, Ann. Rep. Geol. Sur. Wisconsin for the year 1877, p. 70.
1882. Monticulipora rectangularis. Whitfield, Geol. Sur. Wisconsin, IV, p. 249, pl. xi, 11, 12.
1878. Monticulipora multituberculata. Whitfield, Ann. Rep. Geol. Sur. Wisconsin for the year 1877, p. 71.
1882. Monticulipora multituberculata. Whitfield, Geol. Sur. Wisconsin, IV, p. 250, pl. xi, 9, 10.
Cincinnati (Richmond): A common and characteristic species of the Richmond group in Ohio, Indiana, Illinois, Wisconsin, and Manitoba.

Monotrypella simplex Ulrich. See Eridotrypa appressa (Ulrich).

Monotrypella subquadrata Ulrich.

1882. Monotrypella subquadrata. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 249, pl. xi, 4–4*b*.

1894. Monticulipora quadrata var. subquadrata. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 199.

Cincinnati (Richmond): Osgood, Indiana; Blanchester, Hanover, and Oregonia, Ohio.

Monotrypella Trentonensis Foord. See Eridotrypa trentonensis (Nicholson).

Monotrypella ? unjiga Whiteaves.

1891. Monotrypella Unjiga. Whiteaves, Contr. Canadian Pal., I, p. 214, pl. xxx, 1–1*d*.

Devonian: Peace River, Vermilion Falls, Canada.

Obs. This species is probably an Eridotrypa.

MONTICULIPORA D'Orbigny. Genotype: Monticulipora mammulata D'Orbigny.

1850. Monticulipora. D'Orbigny, Prodr. de Pal., I, p. 25.

1860. Monticulipora. Milne-Edwards, Hist. Nat. des Corall, III., p. 272.

1860. Monticulipora. Eichwald, Lethæa Rossica, I, p. 492.

1872. Monticulipora. De Koninck, Nouv. Rech. Anim. Foss. Terr. Carb. Belgique, p. 141.

1879. Monticulipora. Nicholson, Paleozoic Tabulate Corals, p. 269.

1881. Monticulipora. Nicholson, Genus Monticulipora, p. 99.

1882. Monticulipora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, pp. 153, 232.

1883. Monticulipora. Foord, Contr. Micro-Pal. Cambro-Sil., p. 7.

1886. Monticulipora. Waagen and Wentzel, Pal. Indica, Ser. XIII, p. 874.

1888. Monticulipora. James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 158.

1889. Monticulipora. Miller, North American Geol. Pal., p. 197.

1890. Monticulipora. Ulrich, Geol. Sur. Illinois, VIII, pp. 370, 407.

1893. Monticulipora. Ulrich, Geol. Minnesota, III, p. 217.

1893. Monticulipora. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XV, p. 155.

1896. Monticulipora. Zittel's Textb. Pal. (Engl. ed.), p. 103.

1896. Monticulipora. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 272.

1897. Monticulipora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 577.

1881. Peronopora (in part). Nicholson, Genus Monticulipora, p. 215.

Obs. By most writers the genus Monticulipora has been given a very wide acceptation. We have employed the term in its restricted sense as defined by Mr. Ulrich in his latest works, but most of the above citations refer to Monticulipora in a much wider sense.

Monticulipora æqualis J. F. James. See Monotrypella æqualis Ulrich.

Monticulipora affinis J. F. James. See Heterotrypa affinis (Ulrich).

Monticulipora (Fistulipora) alternata James and James. See Cœloclema alternatum (James).

Monticulipora andrewsii James and James. See Callopora andrewsi (Nicholson).

Monticulipora (Heterotrypa) Andrewsii Nicholson. See Callopora andrewsi (Nicholson).

Monticulipora (Constellaria) antheloidea James and James. See Stellipora antheloidea Hall.

Monticulipora approximatus Hall. See **Callopora dalei** (Milne-Edwards and Haime).

Monticulipora arborea Ulrich.

1893. Monticulipora arborea. Ulrich, Geol. Minnesota, III, p. 220, pl. xx, 1-9, 13, 14.
1896. Monticulipora arborea. Ulrich, Zittel's Textb. Pal. (Engl. ed.), fig. 449 (p. 272).
Trenton: Cannon Falls and St. Paul, Minnesota; Decorah, Iowa; Burgin and Frankfort, Kentucky.

Monticulipora arcolata J. F. James. See **Aspidopora areolata** Ulrich.

Monticulipora aspera J. F. James. See **Spatiopora aspera** Ulrich.

Monticulipora (Dekayia) aspera James and James. See **Dekayia aspera** Milne-Edwards and Haime.

Monticulipora asperula J. F. James. See **Petigopora asperula** Ulrich.

Monticulipora (Heterotrypa) Barrandi Nicholson. See **Heterotrypa ? barrandei** (Nicholson).

Monticulipora billingsi Foord.

1883. Monticulipora Billingsi. Foord, Contr. Micro-Pal. Cambro-Sil., p. 8, pl. i, 2-2c.
Trenton: Near Ottawa City, Canada.

Monticulipora briarea James and James. See **Eridotrypa briareus** (Nicholson).

Monticulipora (Monotrypa) briareus Nicholson. See **Eridotrypa briareus** (Nicholson).

Monticulipora calceola Miller and Dyer. See **Leptotrypa calceola** (Miller and Dyer).

Monticulipora (Monotrypa) calceola Nicholson. See **Leptotrypa calceola** (Miller and Dyer).

Monticulipora calycula James and James. See **Aspidopora calycula** (James).

Monticulipora (Diplotrypa) calycula Nicholson. See **Aspidopora calycula** (James).

Monticulipora ? cannonensis Ulrich.

1893. Monticulipora ? cannonensis. Ulrich, Geol. Minnesota, III, p. 221, pl. xx, 10-12.
Trenton (Black River and Trenton): Cannon Falls, Minnesota.

Monticulipora cincinnatiensis (James).

1875. Chætetes cincinnatiensis. James, Catal. Sil. Foss. Cincinnati Group, p. 2.
1881. Monticulipora (Peronopora) Cincinnatiensis. Nicholson, Genus Monticulipora, p. 226, pl. ii, 6-6c.
1882. Monticulipora cincinnatiensis. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 239.
1888. Monticulipora cincinnatiensis. James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 170.
1894. Monticulipora cincinnatiensis. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 188.
Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.

Monticulipora (Peronopora) Cincinnatiensis Nicholson. See **Monticulipora cincinnatiensis** (James).

Monticulipora circularis James. See **Calloporella circularis** (James).

Monticulipora (Heterotrypa) circularis James. See **Calloporella circularis** (James).

Monticulipora clavacoidea James and James. See **Leptotrypa clavacoidea** (James).

Monticulipora (Monotrypa) clavacoidea Nicholson. See **Leptotrypa clavacoidea** (James).

Monticulipora ?? cleavelandi James.

1882. Monticulipora (Heterotrypa ?) cleavelandi. James, Paleontologist, No. 6, p. 49, pl. i, 7.

1888. Monticulipora cleavelandi. James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 15, pl. i, 4.

1895. Monticulipora cleavelandi. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 68.

Cincinnati (Richmond): Lynchburg, Ohio.

Obs. This species may belong to the genus Homotrypa, but the description given is not full enough to determine the genus with any degree of certainty.

Monticulipora ?? clintonensis James.

1882. Monticulipora (Heterotrypa) clintonensis. James, Paleontologist, No. 6, p. 45, pl. i, 9.

1888. Monticulipora clintonensis. James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 20, pl. i, 1, 1*a*.

1895. Monticulipora clintonensis. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 73.

Cincinnati (Richmond): Clinton County, Ohio.

Obs. This is almost certainly a synonym for Heterotrypa subramosa (Ulrich).

Monticulipora communis James and James. See **Callopora oneallicommunis** (James).

Monticulipora compressa J. F. James. See **Peronopora compressa** (Ulrich).

Monticulipora consimilis Ulrich. See **Monticulipora lævis-consimilis** Ulrich.

Monticulipora contexta J. F. James. See **Homotrypella contexta** Ulrich.

Monticulipora crassimuralis J. F. James. See **Monotrypella crassimuralis** Ulrich.

Monticulipora crustulata James and James. See **Chætetes crustulatus** James.

Monticulipora cumulata J. F. James. See **Nicholsonella cumulata** Ulrich.

Monticulipora curvata J. F. James. See **Homotrypa curvata** Ulrich.

Monticulipora dalei Milne-Edwards and Haime. See **Callopora dalei** (Milne-Edwards and Haime).

Monticulipora Dalii Hall (not Milne-Edwards and Haime). See **Callopora ramosa** (D'Orbigny).

Monticulipora Dalii White (not Milne-Edwards and Haime).

1875. Monticulipora Dalii. White, Wheeler's Geogr. Geol. Explor. Sur., IV, p. 66, pl. iv, 5.

Trenton: Silver Canyon, Pahranagat Range, Nevada.

Obs.—Further study of the original type specimens is needed to determine what they are, but it can be safely said that they do not belong where they were referred.

Monticulipora dawsoni James and James. See **Homotrypa dawsoni** (Nicholson).

Monticulipora (Heterotrypa) dawsoni Nicholson. See **Homotrypa dawsoni** (Nicholson).

Monticulipora delicatula James and James. See **Bythopora delicatula** (Nicholson).

Monticulipora discoidea James and James. See **Amplexopora? discoidea** (James).

Monticulipora (Monotrypa) discoidea Nicholson. See **Amplexopora ? discoidea** (James).

Monticulipora dubia J. F. James. See **Diplotrypa? dubia** Ulrich.

Monticulipora dychei James. See **Leptotrypa? dychei** (James).

Monticulipora (Monotrypa) dychei James. See **Leptotrypa? dychei** (James).

Monticulipora eccentrica James and James. See **Aspidopora eccentrica** (James).

Monticulipora (Heterotrypa ?) eccentrica James. See **Aspidopora eccentrica** (James).

Monticulipora elegans James and James. See **Discotrypa elegans** (Ulrich).

Monticulipora falesi James.

1884. Monticulipora falesi. James, Jour. Cincinnati Soc. Nat. Hist., VII, p. 138, pl. vii, 2-2*d*.

1888. Monticulipora falesi. James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 168.

1894. Monticulipora falesi. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 185.

Trenton: Danville, Kentucky.

Obs.—The characters relied upon for making this a species are trivial; an investigation of the types may prove it a valid species.

Monticulipora filiasa D'Orbigny. See **Amplexopora filiosa** (D'Orbigny).

Monticulipora flabellaris J. F. James. See **Homotrypa flabellaris** Ulrich.

Monticulipora frondosa D'Orbigny. See **Heterotrypa frondosa** (D'Orbigny).

Monticulipora frondosa James and James (not D'Orbigny). See **Peronopora decipiens** (Rominger).

Monticulipora (Peronopora) frondosa Nicholson (not D'Orbigny). See **Peronopora decipiens** (Rominger).

Monticulipora fusiformis James and James (not Whitfield). See Lioclemella subfusiformis (James).

Monticulipora gelasinosa J. F. James. See Homotrypa gelasinosa Ulrich.

Monticulipora gracilis James and James. See Bythopora gracilis (Nicholson).

Monticulipora (Heterotrypa) gracilis Nicholson. See Bythopora gracilis (Nicholson).

Monticulipora grandis Ulrich. See Prasopora grandis (Ulrich).

Monticulipora (Fistulipora) granulifera J. F. James. See Homotrypella granulifera (Ulrich).

Monticulipora hamiltonense J. F. James. See Monticulipora ? winchelli Ulrich.

Monticulipora hospitalis James and James. See Prasopora ? hospitalis (Nicholson).

Monticulipora hospitalis var. lævis James and James. See Monticulipora lævis Ulrich.

Monticulipora hospitalis var. neglecta James and James. See Prasopora ? hospitalis (Nicholson).

Monticulipora imperfectum J. F. James. See Hemiphragma imperfectum (Ulrich).

Monticulipora implicatum J. F. James. See Batostoma implicatum (Nicholson).

Monticulipora (Heterotrypa) implicata Nicholson. See Batostoma implicatum (Nicholson).

Monticulipora incompta Ulrich.

1893. Monticulipora incompta. Ulrich, Geol. Minnesota, III, p. 219, pl. xv, 9–12.

Trenton (Black River): Minneapolis, Minnesota.

Monticulipora inflecta J. F. James. See Heterotrypa inflecta Ulrich.

Monticulipora irregularis James and James. See Leptotrypa ? irregularis (Ulrich).

Monticulipora (Monotrypa) irregularis Nicholson. See Leptotrypa ? irregularis (Ulrich).

Monticulipora Jamesi Nicholson. See Batostoma jamesi (Nicholson).

Monticulipora (Heterotrypa) Jamesi Nicholson. See Batostoma jamesi (Nicholson).

Monticulipora ?? kentuckyensis James.

1883. Monticulipora kentuckensis. James, Paleontologist, No. 7, p. 57, pl. ii, 1–1*b*.

1888. Monticulipora kentuckensis. James and James, Jour. Cincinnati Soc. Nat. Hist., X, p. 180, pl. ii, 6*a*–*d*.

1894. Monticulipora kentuckensis. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 203.

Cincinnati (?): Paris, Kentucky.

Obs.—The genus to which this species belongs can not be determined from the descriptions given.

Monticulipora lævis Ulrich.

1882. Monticulipora lævis. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 236, pl. x, 1–1*b*.

1888. Monticulipora hospitalis var. lævis. James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 27.

1895. Monticulipora lævis. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 85.

Cincinnati (Richmond): Oxford, Ohio.

Monticulipora lævis-consimilis Ulrich.

1882. Monticulipora consimilis. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 238, pl. x, 2.

1894. Monticulipora consimilis. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 189.

Cincinnati (Richmond): Oxford, Ohio.

Monticulipora lamellosa Ulrich.

1890. Monticulipora lamellosa. Ulrich, Geol. Sur. Illinois, VIII, p. 408, pl. xxxii, 4–4*b*.

1895. Monticulipora lamellosa. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 83.

Cincinnati (Richmond): Wilmington, Illinois.

Monticulipora lens James and James (not Nebulipora lens McCoy). See Calloporella circularis (James).

Monticulipora (Dekayia) maculata J. F. James. See Dekayia maculata James.

Monticulipora mammillosa Simpson. See Monticulipora molesta Nicholson.

Monticulipora mammulata James and James (not D'Orbigny). See Heterotrypa frondosa (D'Orbigny).

Monticulipora (Heterotrypa) mammulata Nicholson (not D'Orbigny). See Heterotrypa frondosa (D'Orbigny).

Monticulipora mammulata D'Orbigny.

1850. Monticulipora mammulata. D'Orbigny, Prodr. de Pal., I, p. 25.

1851. Chætetes mammulatus. Milne-Edwards and Haime, Pol. Foss. Terr. Pal., p. 267, pl. xix, 1, 1*a*.

1854. Monticulipora mammulata. Milne-Edwards and Haime, British Foss. Corals, p. 265.

1860. Monticulipora mammulata. Milne-Edwards, Hist. Nat. des Corall., III, p. 276.

1882. Monticulipora mammulata. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 234.

1883. Monticulipora mammulata. Hall, Twelfth Ann. Rep. Indiana Geol. Nat. Hist., p. 250, pl. xi, 1.

Not Monticulipora mammulata. James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 16; J. F. James, ibid., XVIII, p. 69 (=Heterotrypa frondosa (D'Orbigny)).

Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity; Maury County, Tennessee.

Monticulipora mammulata var. molesta Ulrich. See Monticulipora molesta Nicholson.

Monticulipora meeki James and James. See Bythopora meeki (James).

Monticulipora (Chætetes) meeki James. See Bythopora meeki (James).

Monticulipora (Fistulipora) milfordensis James and James. See Ceramoporella granulosa-milfordensis (James).

Monticulipora molesta Nicholson.

1881. Monticulipora (Peronopora) molesta. Nicholson, Genus Monticulipora, p. 224, pl. vi, 2-*2d*.

1882. Monticulipora mammulata var. molesta. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 236.

1889. Monticulipora mammulata. Nicholson, Manual Pal., p. 355.

1895. Monticulipora molesta. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 68.

1897. Monticulipora mammillosa (in error). Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 577, pl. xvii, 1-3.

Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity; Maury County, Tennessee.

Monticulipora (Heterotrypa) moniliformis Nicholson. See Heterotrypa ? moniliformis (Nicholson).

Monticulipora ? monticula White.

1876. Monticulipora monticula. White, Proc. Acad. Nat. Sci. Philadelphia, p. 27.

Hamilton: Iowa City and Buffalo, Iowa.

Monticulipora multituberculata Whitfield. See Monotrypella quadrata (Rominger).

Monticulipora newberryi James and James. See Aspidopora newberryi (Nicholson).

Monticulipora (Prasopora) Newberryi Nicholson. See Aspidopora newberryi (Nicholson).

Monticulipora newportensis James and James. See Atactoporella newportensis Ulrich.

Monticulipora (Fistulipora) nicholsoni James and James. See Chiloporella nicholsoni (James).

Monticulipora nodulosa James and James. See Callopora nodulosa (Nicholson).

Monticulipora (Heterotrypa) nodulosa Nicholson. See Callopora nodulosa (Nicholson).

Monticulipora ohioensis James. See Dekayella ulrichi-robusta Foord.

Monticulipora o'nealli James and James. See Callopora onealli (James).

Monticulipora (Heterotrypa) O'Nealli Nicholson (not of James). See Callopora onealli-sigillarioides (Nicholson).

Monticulipora (Heterotrypa) o'nealli ? var. communis James. See Callopora onealli-communis (James).

Monticulipora ortoni James and James. See Atactoporella ortoni (Nicholson).

Monticulipora (Peronopora ?) Ortoni Nicholson. See Atactoporella ortoni (Nicholson).

Monticulipora ? Ortoni Whitfield (not of Nicholson). See **Monotrypa nodosa** Ulrich.

Monticulipora (Fistulipora) oweni James and James. See **Cœloclema** oweni (James).

Monticulipora papillata Milne-Edwards, James and James (not Nebulipora papillata McCoy).

1860. Monticulipora papillata. Milne-Edwards, Hist. Nat. des Corall., III, p. 275.
1888. Monticulipora papillata. James & James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 23.
1895. Monticulipora papillata. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 81.
Obs. The form referred as above can not be identified from the description; probably a variety of forms was included.

Monticulipora parasitica Ulrich.

1882. Monticulipora parasitica. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 238, pl. x, 3, 3*a*.
1895. Monticulipora parasitica. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 81.
Cincinnati (Richmond): Oxford and Hanover, Ohio; Richmond, Indiana; Wilmington and Savannah, Illinois.

Monticulipora parasitica-plana Ulrich.

1889. Monticulipora parasitica var. plana. Ulrich, Contr. Micro-Pal. Cambro-Sil., Part II, p. 29, pl. viii, 3–3*d*.
1895. Monticulipora parasitica var. plana. Whiteaves, Pal. Foss., III, p. 115.
Cincinnati (Richmond): Stony Mountain, Manitoba.

Monticulipora (Constellaria) parva J. F. James. See **Constellaria parva** (Ulrich).

Monticulipora pavonia Milne-Edwards. See **Escharopora pavonia** (D'Orbigny).

Monticulipora (Monotrypa) pavonia Nicholson. See **Escharopora** pavonia (D'Orbigny).

Monticulipora (Dekayia) pelliculata J. F. James. See **Dekayia pelliculata** Ulrich.

Monticulipora petasiformis James and James. See **Amplexopora** petasiformis (Nicholson).

Monticulipora (Monotrypa) petasiformis Nicholson. See **Amplexopora** petasiformis (Nicholson).

Monticulipora petasiformis var. welchi James and James. See **Amplexopora** petasiformis-welchi (James).

Monticulipora petechialis James and James. See **Petigopora petechialis** (Nicholson).

Monticulipora (Constellaria) polystomella James and James (not Nicholson). See (in part) Constellaria constellata (Van Cleve) **Dana and** (in part) Constellaria polystomella Nicholson.

Monticulipora prolifica J. F. James. See **Heterotrypa subramosa**-prolifica Ulrich.

Monticulipora punctata Whitfield. See Constellaria **punctata (Whitfield).**

Monticulipora pustulosa J. F. James. See Amplexopora pustulosa Ulrich.

Monticulipora quadrata James and James. See Monotrypella quadrata (Rominger).

Monticulipora (Monotrypa) quadrata Nicholson. See Monotrypella quadrata (Rominger).

Monticulipora quadrata var. subquadrata J. F. James. See Monotrypella subquadrata Ulrich.

Monticulipora ramosa D'Orbigny. See Callopora ramosa (D'Orbigny).

Monticulipora (Heterotrypa) ramosa Nicholson. See Callopora ramosa (D'Orbigny).

Monticulipora ramosa var. dalei James and James. See Callopora dalei (Milne-Edwards and Haime).

Monticulipora (Heterotrypa) ramosa var. dalei Nicholson. See Callopora dalei (Milne-Edwards and Haime).

Monticulipora ramosa var. rugosa James and James. See Callopora rugosa (Milne-Edwards and Haime).

Monticulipora (Heterotrypa) ramosa var. rugosa Nicholson. See Callopora rugosa (Milne-Edwards and Haime).

Monticulipora rectangularis Whitfield. See Monotrypella quadrata (Rominger).

Monticulipora rugosa Milne-Edwards and Haime. See Callopora rugosa (Milne-Edwards and Haime).

Monticulipora (Fistulipora) rustica J. F. James. See Homotrypella rustica Ulrich.

Monticulipora selwynii J. F. James (not Nicholson). See Prasopora simulatrix Ulrich.

Monticulipora (Prasopora) Selwynii Nicholson. See Prasopora selwyni (Nicholson).

Monticulipora (Prasopora) Selwynii var. hospitalis Nicholson. See Prasopora ? hospitalis (Nicholson).

Monticulipora septosa James and James. See Amplexopora septosa (Ulrich).

Monticulipora simulatrix J. F. James. See Eridotrypa simulatrix (Ulrich).

Monticulipora singularis J. F. James. See Heterotrypa singularis (Ulrich).

Monticulipora stidhami J. F. James. See Leptotrypa stidhami Ulrich.

Monticulipora subcylindrica James. See Amplexopora filiosa (D'Orbigny).

Monticulipora (? Monotrypa) subfusiformis James. See Lioclemella subfusiformis (James).

Monticulipora subpulchella James and James. See Heterotrypa subpulchella (Nicholson).

Monticulipora (Heterotrypa) subpulchella Nicholson. See Heterotrypa subpulchella (Nicholson).

Monticulipora (Heterotrypa) Trentonensis Nicholson. See Eridotrypa trentonensis (Nicholson).

Monticulipora tuberculata James and James. See Spatiopora tuberculata (Milne-Edwards and Haime).

Monticulipora (Monotrypa) tuberculata Nicholson (not Milne-Edwards and Haime). See Spatiopora corticans (Nicholson).

Monticulipora turbinata James and James. See Monotrypa turbinata (James).

Monticulipora ulrichi James and James. See Dekayella ulrichi (Nicholson).

Monticulipora (Heterotrypa) Ulrichii Nicholson. See Dekayella ulrichi (Nicholson).

Monticulipora undulata James and James. See Monotrypa undulata (Nicholson).

Monticulipora (Monotrypa) undulata Nicholson. See Monotrypa undulata (Nicholson).

Monticulipora undulata var. hemispherica J. F. James. See Monotrypa undulata-hemispherica (J. F. James).

Monticulipora uniformis J. F. James. See Peronopora compressa Ulrich.

Monticulipora varians James and James. See Batostoma varians (James).

Monticulipora (Chætetes) varians James. See Batostoma varians (James).

Monticulipora vaupeli James and James. See Nicholsonella vaupeli (Ulrich).

Monticulipora (Fistulipora) venusta James and James. See Crepipora venusta (Ulrich).

Monticulipora verrucosa J. F. James. See Calloporella ? nodulosa (Ulrich).

Monticulipora (Monotrypa) welchi James. See Amplexopora petasiformis-welchi (James).

Monticulipora westoni Foord.

1883. Monticulipora Westoni. Foord, Contributions Micro-Pal. Cambro-Sil., p. 7, pl. i, 1-1*b*.

Trenton: Ottawa City, Canada.

Monticulipora wetherbyi Ulrich.

1882 Monticulipora wetherbyi. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 239, pl. x, 4-4*b*.

1886. Monticulipora wetherbyi. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Sur. Minnesota, p. 129.

1888. Monticulipora wetherbyi. James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 24.

1889. Monticulipora wetherbyi. Ulrich, Contr. Micro-Pal. Cambro-Sil., Part II, p. 30.

Monticulipora wetherbyi Ulrich—Continued.

1893. Monticulipora wetherbyi. Ulrich, Geol. Minnesota, III, p. 218, pl. xv, 7, 8.
1897. Monticulipora Wetherbyi. Whiteaves, Pal. Foss., III, p. 162.
Trenton (Stones River): High Bridge, Kentucky; Minneapolis, Minnesota; St. Andrews, Manitoba.

Monticulipora wetherbyi var. asperula James and James. See Petigopora asperula Ulrich.

Monticulipora whiteavesii James and James. See Mesotrypa whiteavesi (Nicholson).

Monticulipora (Diplotrypa) Whiteavesii Nicholson. See (in part) Prasopora selwyni (Nicholson), (in part) Prasopora simulatrix-orientalis Ulrich, (in part) Mesotrypa whiteavesi (Nicholson).

Monticulipora whitfieldi James and James. See Hemiphragma whitfieldi (James).

Monticulipora (Chætetes) whitfieldi James. See Hemiphragma whitfieldi (James).

Monticulipora wilmingtonense J. F. James. See Lioclema ? wilmingtonense Ulrich.

Monticulipora ? winchelli Ulrich.

1890. Monticulipora winchelli. Ulrich, Geol. Sur. Illinois, VIII, p. 408, pl. xlv, 6, 6*a*.
1895. Monticulipora hamiltonense. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 87.
Hamilton: Near Alpena, Michigan.

Monticulipora ?? winchelli James.

1882. Monticulipora (Heterotrypa) winchelli. James, Paleontologist, No. 6, p. 48.
1883. Monticulipora winchelli. James, Paleontologist, No. 7, pl. i, 5.
1895. Monticulipora winchelli. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 87.
Cincinnati (Richmond): Near Lynchburg, Highland County, Ohio.
Obs. Species probably valid, but generic position has not yet been determined.

Monticulipora (Heterotrypa) winchelli James. See Monticulipora ?? winchelli James.

Monticulipora ?? wortheni James.

1882. Monticulipora (Monotrypa) wortheni. James, Paleontologist, No. 6, p. 50, pl. i, 2.
1894. Monticulipora wortheni. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 207.
Cincinnati (Richmond): Lynchburg, Highland County, Ohio.
Obs. The description given is insufficient to decide the generic position.

Nebulipora McCoy. Genotype: Nebulipora papillata McCoy.

1850. Nebulipora. McCoy, Ann. Mag. Nat. Hist., ser. 2, VI, p. 282.
1852. Nebulipora. McCoy, British Pal. Foss., p. 22.
1882. Nebulipora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 155.
Obs. Nothing has been added to McCoy's original descriptions. The genus, apparently monticuliporoid in its structure, not having been characterized with the precision necessary for modern purposes, has not been used by recent writers.

NEMATAXIS Hall. Genotype: Nemataxis fibrosus Hall.

1886. Nemataxis. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, explanation pl. xxv.
1887. Nemataxis. Hall and Simpson, Pal. New York, VI, p. xv.
1889. Nemataxis. Miller, North American Geol. Pal., p. 313.
1897. Nemataxis. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 552.

Nemataxis fibrosus Hall.

1886. Nemataxis fibrosus. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxv, 30–36.
1887. Nemataxis fibrosus. Hall and Simpson, Pal. New York, VI, p. 74, pl. xxv, 30–36.
1897. Nemataxis fibrosus. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xvi, 15–18.
Upper Helderberg: Ontario, Canada.

Nemataxis ? simplex Hall and Simpson.

1887. Nemataxis simplex. Hall and Simpson, Pal. New York, VI, p. 193, pl. lxvi, 17–19.
Hamilton: Darien Center, New York.

NEMATOPORA Ulrich. Genotype: Nematopora ovalis Ulrich.

1888. Nematopora. Ulrich, American Geologist, I, p. 234.
1889. Nematopora. Miller, North American Geol. Pal., p. 313.
1890. Nematopora. Ulrich, Geol. Sur. Illinois, VIII, pp. 401, 644.
1893. Nematopora. Ulrich, Geol. Minnesota, III, p. 204.
1896. Nematopora. Ulrich, Zittel's Textb. Pal. (Eng. ed.), p. 281.
1897. Nematopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 553.

Nematopora alternata Ulrich.

1890. Nematopora alternata. Ulrich, Geol. Sur. Illinois, VIII, p. 646, pl. xxix, 8, 8*a*.
Trenton: Alexander County, Illinois.

Nematopora conferta Ulrich.

1890. Nematopora conferta. Ulrich, Jour. Cincinnati Soc. Nat. Hist., XII, p. 198, fig. 22.
1893. Nematopora conferta. Ulrich, Geol. Minnesota, III, p. 206, pl. iii, 21–23.
Trenton: Cannon Falls, Minnesota.

Nematopora delicatula Ulrich.

1890. Nematopora delicatula. Ulrich, Geol. Sur. Illinois, VIII, p. 646, pl. xxix, 11–11*b*.
1893. Nematopora delicatula. Ulrich, Geol. Minnesota, III, p. 206, pl. iii, 26, 27.
1897. Nematopora delicatula. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 124, 125 (p. 553).
Trenton: Alexander County, Illinois; Cannon Falls, Minnesota.

Nematopora formosa (Billings).

1866. Helopora formosa. Billings, Catal. Sil. Foss. Anticosti, p. 37.
1890. Nematopora formosa. Ulrich, Geol. Sur. Illinois, VIII, p. 645.
Anticosti: Anticosti Island.
Obs. See also Helopora ? concava Billings.

Nematopora fragilis Ulrich.

1890. Nematopora fragilis. Ulrich, Geol. Sur. Illinois, VIII, p. 646, pl. xxix, 10–10*c*.
Trenton: Alexander County, Illinois.

Nematopora granosa Ulrich.

1890. Nematopora granosa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., XII, p. 196, fig. 20.
1893. Nematopora granosa. Ulrich, Geol. Minnesota, III, p. 205, pl. iii, 17–20.
Trenton: Cannon Falls, Minnesota.

Nematopora lineata (Billings).

1866. Helopora lineata. Billings, Catal. Sil. Foss. Anticosti, p. 36.
1890. Nematopora lineata. Ulrich, Geol. Sur. Illinois, VIII, p. 646, pl. xxix, 7–7*e*.
Anticosti: Anticosti Island.

Nematopora ? lineopora (Billings).

1866. Helopora lineopora. Billings, Catal. Sil. Foss. Anticosti, p. 38.
1890. Nematopora ? lineopora. Ulrich, Geol. Sur. Illinois, VIII, p. 645.
Anticosti: Anticosti Island.

Nematopora macropora (Hall).

1883. Trematopora ? (Trachypora ?) macropora. Hall, Trans. Albany Institute, X, p. 60 (abstract, 1879, p. 4).
1882. Trematopora ? (Trachypora ?) macropora. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 236.
Niagara: Waldron, Indiana.

Nematopora minuta (Hall).

1876. Trematopora ? (Trachypora ?) minuta. Hall, Twenty-eighth Ann. Rep. New York State Museum (documentary edition), pl. xi, 8.
1879. Trematopora minuta. Hall, Twenty-eighth Ann. Rep. New York State Museum (Museum edition), p. 113, pl. xi, 8.
1882. Trematopora minuta. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 234, pl. x, 8.
1890. Nematopora minuta. Ulrich, Geol. Sur. Illinois, VIII, p. 645.
Niagara: Waldron, Indiana.

Nematopora ovalis Ulrich.

1890. Nematopora ovalis. Ulrich, Jour. Cincinnati Soc. Nat. Hist., XII, p. 197, fig. 21.
1893. Nematopora ovalis. Ulrich, Geol. Minnesota, III, p. 204, pl. iii, 24, 25.
1890. Nematopora quadrata. Ulrich, Geol. Sur. Illinois, VIII, p. 644, pl. xxix, 12–12*c*.
1897. Nematopora quadrata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 124, 125 (p. 553).
Trenton; Cannon Falls, Minnesota; Montreal, Canada; Trenton Falls, New York.

Nematopora quadrata Ulrich. See Nematopora ovalis Ulrich.

Nematopora raripora (Hall).

1852. Stictopora raripora. Hall, Pal. New York, II, p. 46, pl. xviii, 5*a*–*c*.
1874. Ptilodictya ? raripora. Nicholson and Hinde, Canadian Jour., new ser., XIV, p. 142.
1875. Ptilodictya ? raripora. Nicholson, Pal. Province Ontario, p. 45, figs. 19, 4, 4*a*.
Clinton: Flamborough Head, Ontario.
Niagara: Lockport, New York.

Nematopora retrorsa Ulrich.

1890. Nematopora retrorsa. Ulrich, Geol. Sur. Illinois, VIII, p. 645, pl. xxix, 9–9*b*.
Trenton: Alexander county, Illinois.

Nematopora striatopora (Billings).
1866. Helopora striatopora. Billings, Catal. Sil. Foss. Anticosti, p. 39.
1890. Nematopora striatopora. Ulrich, Geol. Sur. Illinois, VIII, p. 645.
Anticosti: Anticosti Island.

Nematopora strigosa (Billings).
1866. Helopora strigosa. Billings, Catal. Sil. Foss. Anticosti, p. 37.
1890. Nematopora strigosa. Ulrich, Geol. Sur. Illinois, VIII, p. 645.
Anticosti: Anticosti Island.

NICHOLSONELLA Ulrich. Genotype: Nicholsonella ponderosa Ulrich.
1890. Nicholsonella. Ulrich, Geol. Sur. Illinois, VIII, pp. 374, 421.
1889. Nicholsonella. (Ulrich, in press), Miller, North American Geol. Pal., p. 313.
1893. Nicholsonella. Ulrich, Geol. Minnesota, III, p. 313.
1896. Nicholsonella. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 276.
1897. Nicholsonella. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 590.

Nicholsonella cumulata Ulrich.
1890. Nicholsonella cumulata. Ulrich, Geol. Sur. Illinois, VIII, p. 423, pl. xxxiii, 6–6*c*.
1895. Monticulipora cumulata. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 74.
1897. Nicholsonella cumulata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 183–186 (p. 590).
Cincinnati (Richmond): Wilmington, Illinois.

Nicholsonella laminata Ulrich.
1893. Nicholsonella laminata. Ulrich, Geol. Minnesota, III, p. 315, pl. xxi, 15–19, 21.
Trenton (Black River): Minneapolis and St. Paul, Minnesota.

Nicholsonella ponderosa Ulrich.
1890. Nicholsonella ponderosa. Ulrich, Geol. Sur. Illinois, VIII, p. 422, pl. xxxiv, 5–5*d*.
1893. Nicholsonella ponderosa (?). Ulrich, Geol. Minnesota, III, p. 316, pl. xxi, 13, 14, 20, 22.
Trenton (Stones River): Dixon, Illinois; Minneapolis, Minnesota.

Nicholsonella pulchra Ulrich.
1893. Nicholsonella pulchra. Ulrich, Geol. Minnesota, III, p. 314, pl. xxi, 8–12.
1896. Nicholsonella pulchra. Ulrich, Zittel's Textb., Pal. (Eng. ed.), fig. 462 (p. 276).
Trenton (Stones River): Murfreesboro, Tennessee.

Nicholsonella vaupeli (Ulrich).
1883. Heterotrypa vaupeli. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 85, pl. i, 2–2*b*.
1888. Monticulipora vaupeli. James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 19.
1890. Nicholsonella vaupeli. Ulrich, Geol. Sur. Illinois, VIII, p. 421.
1895. Monticulipora vaupeli. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 71.
Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.

Nicholsonia Waagen and Wentzel. See Escharopora Hall.

Nicholsonia Davis (not Waagen and Wentzel). See **Hederella Hall.**

Nicholsonia **adnata Davis.** See **Hederella adnata (Davis).**

Nicholsonia angulata Davis. Not a fossil.

1885. Nicholsonia angulata. Davis, Kentucky Foss. Corals, Part II, pl. lxxx, 16.
Hamilton: Falls of the Ohio.

Nicholsonia canadensis Davis. See Hederella canadensis (Nicholson).

Nicholsonia pavonica Waagen and Wentzel. See Escharopora pavonia (D'Orbigny).

Odontotrypa Hall. See Buskopora Ulrich.

Odontotrypa alveata Simpson. See Buskopora bistriata (Hall).

Omniretepora D'Orbigny. Not recognized. (See Geol. Sur. Illinois, VIII, p. 687).

1850. Omniretepora D'Orbigny, Prodr. de Pal., I, p. 45.

Omniretepora anastomosa D'Orbigny. Not recognizable.

1850. Omniretepora anastomosa. D'Orbigny, Prodr. de Pal., I, p. 45.
"Etats-Unis, failles de l'Ohio."

ORBIPORA Eichwald. Genotype: Orbitulites distinctus Eichwald.

1829. Orbitulites. Eichwald, Zool. Spec., I, p. 179. (Name was preoccupied.)
1860. Orbitulites. Milne-Edwards, Hist. Nat. des Corall., III, p. 271.
1856. Orbipora. Eichwald, Bull. de la Soc. des Natural. de Moscou, XXIX, p. 92.
1860. Orbipora. Eichwald, Lethæa Rossica, I, p. 484.
1877. Orbipora. Dybowsky, Die Chætetiden der Ostbaltischen Silur-Form., p. 57.
1881. Orbipora. Nicholson, Genus Monticulipora, p. 24.
1886. Orbipora. Waagen and Wentzel, Pal. Indica, Ser. XIII, pp. 874, 876.

Obs. The validity and systematic position of this genus are still in question. Of Eichwald's original species, as identified by Dybowski, the Orbipora distincta is closely related to Chætetes discoideus Nicholson, which we have doubtfully referred to Amplexopora, as it has certain characters which may require its removal to the Heterotrypidæ; the Orbipora panderi is very different, being an unequivocal Hemiphragma.

ORTHOPORA Hall. Genotype: Trematopora regularis Hall.

1886. Orthopora. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, explanation pl. xxv.
1887. Orthopora. Hall and Simpson, Pal. New York, VI, pp. xiv, 16.
1889. Orthopora. Miller, North American Geol. Pal., p. 313.

Obs. Simpson appears to give up Orthopora by referring the genotype to Rhombopora (Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xix, 10, 11); but until the type species is better known the genus had best be allowed to stand.

Orthopora bispinulata (Hall).

1883. Callopora bispinulata. Hall, Trans. Albany Institute, X, p. 182 (abstract, 1881, p. 182).
1884. Callopora bispinulata. Hall, Rep. State Geologist New York for the year 1883, p. 14.
1887. Trematopora (Orthopora) bispinulata. Hall and Simpson, Pal. New York, VI, p. 182, pl. lv, 27–30, pl. lvi, 16–18.
1889. Acanthoclema bispinulatum. Miller, North American Geol. Pal., p. 291.
1889. Orthopora bispinulata. Miller, North American Geol. Pal., p. 313.
Hamilton: Moscow, New York.

Orthopora canaliculata (Hall).

1879. Trematopora canaliculata. Hall, Thirty-second Ann. Rep. New York State Museum, p. 151 (reprint, 1880, p. 13).

Orthopora canaliculata (Hall)—Continued.

1883. Trematopora ? canaliculata. Hall, Rep. State Geologist New York for the year 1882, pl. xi, 12.

1887. Trematopora (Orthopora) canaliculata. Hall and Simpson, Pal. New York, VI, p. 17, pl. xi, 12, pl. xxiii, 9.

Lower Helderberg: Clarksville, New York.

Orthopora carinata (Hall and Simpson).

1887. Trematopora (Orthopora) carinata. Hall and Simpson, Pal. New York, VI, p. 179, pl. lv, 2, pl. lvi, 3.

1898. Trematopora carinata. Whiteaves, Contr. Canadian Pal., 1, p. 379.

Hamilton: West Williams, Ontario.

Orthopora elongata (Hall and Simpson).

1887. Trematopora (Orthopora) elongata. Hall and Simpson, Pal. New York, VI, p. 183, pl. lv, 11, pl. lvi, 15.

Hamilton: Near Lake Canandaigua and Lake Owasco, New York.

Obs. Orthopora transversa and Orthopora interplana appear to be synonyms of this species.

Orthopora granifera (Hall and Simpson).

1887. Trematopora (Orthopora) granifera. Hall and Simpson, Pal. New York, VI, p. 186.

Hamilton: Owasco Lake, New York.

Orthopora granilinea (Hall and Simpson).

1887. Trematopora (Orthopora) granilinea. Hall and Simpson, Pal. New York, VI, pl. xxiii, 2.

Lower Helderberg: Clarksville, New York.

Orthopora hexagona (Hall and Simpson).

1887. Trematopora (Orthopora) hexagona. Hall and Simpson, Pal. New York, VI, p. 178, pl. lv, 8, pl. lvi, 2.

1899. Rhombopora hexagona. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 164, fig. 53.

1897. Rhombopora transversa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xix, 12, 13.

Hamilton: Eighteen-Mile Creek, shore of Lake Erie, New York.

Orthopora immersa (Hall and Simpson.)

1887. Trematopora (Orthopora) immersa. Hall and Simpson, Pal. New York, VI, p. 185, pl. lvi, 11.

1899. Rhombopora immersa. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 166, fig. 57.

Hamilton: Darien Center and West Hamburg, New York.

Orthopora interplana (Hall and Simpson).

1887. Trematopora (Orthopora) interplana. Hall and Simpson, Pal. New York, VI, p. 186, pl. lvi, 12.

Hamilton: Near Lake Canandaigua, New York.

Obs. See remark on Orthopora elongata.

Orthopora lineata (Hall and Simpson).

1887. Trematopora (Orthopora) lineata. Hall and Simpson, Pal. New York, VI, p. 181, pl. lv, 3-6, pl. lvi, 10.

1899. Rhombopora lineata. Grabau, Bull. Buffalo Soc. Nat. Sci., VI., p. 165, fig. 56.

Hamilton: Darien Center and West Hamburg, New York.

Orthopora nodosa (Hall and Simpson).

1887. Trematopora (Orthopora) nodosa. Hall and Simpson, Pal. New York, VI, pl. xxiii, 10.

Lower Helderberg: Clarksville, New York.

Orthopora orbipora (Hall).

1883. Trematopora orbipora. Hall, Trans. Albany Institute, X, p. 181 (abstract, 1881, p. 181).

1884. Trematopora orbipora. Hall, Rep. State Geologist New York for the year 1883, p. 12.

1887. Trematopora (Orthopora ?) orbipora. Hall and Simpson, Pal. New York, VI, p. 188, pl. lv, 13, 14, pl. lvi, 8.

Hamilton: Fallbrook, near Lake Canandaigua, New York.

Orthopora ornata (Hall and Simpson).

1887. Trematopora (Orthopora) ornata. Hall and Simpson, Pal. New York, VI, p. 184, pl. lv, 1, pl. lvi, 4.

Hamilton: Near Geneseo, New York.

Orthopora ovatipora (Hall).

1879. Trematopora ovatipora. Hall, Thirty-second Ann. Rep. New York State Museum, p. 151 (reprint, 1880, p. 13).

1883. Trematopora? ovatipora. Hall, Rep. State Geologist New York for the year 1882, pl. xi, 9–11.

1887. Trematopora (Orthopora) ovatipora. Hall and Simpson, Pal. New York, VI, p. 17, pl. xi, 9–11, pl. xxiii, 5.

Lower Helderberg: Clarksville, New York.

Orthopora parallela (Hall).

1879. Trematopora parallela. Hall, Thirty-second Ann. Rep. New York State Museum, p. 152 (reprint, 1880, p. 14).

1883. Trematopora ? parallela. Hall, Rep. State Geologist New York for the year 1882, pl. xi, 13, 14.

1887. Trematopora (Orthopora) parallela. Hall and Simpson, Pal. New York, VI, p. 19, pl. xi, 13, 14, pl. xxiii, 7, 8.

Lower Helderberg: Clarksville, New York.

Orthopora polygona (Hall).

1883. Trematopora polygona. Hall, Trans. Albany Institute, X, p. 180 (abstract, 1881, p. 180).

1884. Trematopora polygona. Hall, Rep. State Geologist New York for the year 1883, p. 9.

1887. Trematopora (Orthopora) polygona. Hall and Simpson, Pal. New York, VI, p. 176.

1899. Rhombopora polygona. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 164.

Hamilton: West Hamburg, New York.

Orthopora regularis (Hall).

1874. Trematopora regularis. Hall, Twenty-sixth Ann. Rep. New York State Museum, p. 106.

1879. Trematopora regularis. Hall, Thirty-second Ann. Rep. New York State Museum, p. 151 (reprint, 1880, p. 13).

1883. Trematopora regularis. Hall, Rep. State Geologist New York for the year 1882, pl. xi, 1-8, pl. xiii, 1–3 (in part).

1887. Trematopora (Orthopora) regularis. Hall and Simpson, Pal. New York, VI, p. 16, pl. xi, 1-8, pl. xxiii, 1.

Lower Helderberg: Clarksville, New York.

Orthopora regularis (Hall)—Continued.

1883. Trematopora regularis. Hall, Rep. State Geologist New York for the year 1882, pl. xxiv, 5, 6.

1886. Orthopora regularis. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxv, 27, 28.

1887. Trematopora (Orthopora) regularis. Hall and Simpson, Pal. New York, VI, p. 71, pl. xxv, 27, 28, pl. xxvi, 5, 6.

1897. Rhombopora regularis. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xix, 10, 11.

Hamilton: Falls of the Ohio.

Obs. The above arrangement has been given because the two forms are undoubtedly distinct. The Hamilton species should be compared with Rhombopora lineinodis Ulrich.

Orthopora reticulata (Hall and Simpson).

1887. Trematopora (Orthopora) reticulata. Hall and Simpson, Pal. New York, VI, p. 179, pl. lv, 9, pl. lvi, 5.

1899. Rhombopora reticulata. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 165, fig. 54.

Hamilton: West Hamburg, Erie County, New York.

Obs. Probably the same as Orthopora subquadrata.

Orthopora rhombifera (Hall).

1874. Trematopora rhombifera. Hall, Twenty-sixth Ann. Rep. New York State Museum, p. 103.

1879. Trematopora rhombifera. Hall, Thirty-second Ann. Rep. New York State Museum, p. 152 (reprint, 1880, p. 14).

1883. Trematopora rhombifera. Hall, Rep. State Geologist New York for the year 1882, pl. xi, 15–20.

1887. Trematopora (Orthopora) rhombifera. Hall and Simpson, Pal. New York, VI, p. 18, pl. xi, 15, 17–20, pl. xxiii, 11, 12.

Lower Helderberg: Clarksville and Schoharie, New York.

1883. Trematopora rhombifera. Hall, Rep. State Geologist New York for the year 1882, pl. xxiv, 3, 4.

1886. Orthopora rhombifera. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxv, 29.

1887. Trematopora (Orthopora) rhombifera. Hall and Simpson, Pal. New York, VI, p. 71, pl. xxv, 29, pl. xxvi, 3, 4.

Hamilton: Falls of the Ohio.

Obs. The above arrangement has been given because the two forms, though considered identical by Hall, are undoubtedly distinct.

Orthopora scutulata (Hall).

1883. Trematopora scutulata. Hall, Trans. Albany Institute, X, p. 148 (abstract, 1881, p. 6).

1883. Trematopora (Orthopora) scutulata. Hall, Rep. State Geologist New York for the year 1882, pl. xxiv, 7, 8.

1887. Trematopora (Orthopora) scutulata. Hall and Simpson, Pal. New York, VI, p. 70, pl. xxvi, 7, 8.

Upper Helderberg: Waterville and Onondaga Valley, New York.

Orthopora subquadrata (Hall).

1883. Trematopora subquadrata. Hall, Trans. Albany Institute, X, p. 181 (abstract, 1881, p. 181).

1884. Trematopora subquadrata. Hall, Rep. State Geologist New York for the year 1883, p. 11.

Orthopora subquadrata (Hall)—Continued.

1887. Trematopora (Orthopora) subquadrata. Hall and Simpson, Pal. New York, VI, p. 177, pl. lv, 10, pl. lvi, 1, 6.

Hamilton: Darien Center, New York.

Obs. See remark under Orthopora reticulata.

Orthopora tortalinea (Hall).

1883. Trematopora tortalinea. Hall, Trans. Albany Institute, X, p. 180 (abstract, 1881, p. 180).

1884. Trematopora tortalinea. Hall, Rep. State Geologist New York for the year 1883, p. 10.

1887. Trematopora (Orthopora) tortalinea. Hall and Simpson, Pal. New York, VI, p. 180, pl. lvi, 9.

1899. Rhombopora tortalinea. Grabau, Bull. Buffalo Soc. Nat. Hist., VI, p. 165, fig. 55.

Hamilton: Hamburg, New York.

Orthopora transversa (Hall).

1883. Trematopora transversa. Hall, Trans. Albany Institute, X, p. 180 (abstract, 1881, p. 180).

1884. Trematopora transversa. Hall, Rep. State Geologist New York for the year 1883, p. 8.

1887. Trematopora (Orthopora?) transversa. Hall and Simpson, Pal. New York, VI, p. 187, pl. lv, 12, pl. lvi, 13, 14.

1889. Rhombopora? transversa. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 164, fig. 52.

Hamilton: Hamburg, Erie County, New York.

Obs. See remark under Orthopora elongata.

PACHYDICTYA Ulrich. Genotype: Pachydictya robusta Ulrich.

1882. Pachydictya. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 152.

1887. Pachydictya. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 162.

1889. Pachydictya. Miller, North American Geol. Pal., p. 313.

1890. Pachydictya. Ulrich, Geol. Sur. Illinois, VIII, pp. 390, 522.

1893. Pachydictya. Ulrich, Geol. Minnesota, III, p. 145.

1897. Pachydictya. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 530.

Pachydictya acuta (Hall).

1847. Stictopora? acuta. Hall, Pal. New York, I, p. 74, pl. xxvi, 3*a*–*b*.

1875. Ptilodictya acuta. Nicholson, Pal. Province Ontario, p. 12, fig. 3.

1882. Stictopora acuta. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 168, pl. viii, 1–1*b*.

1886. Pachydictya acuta. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Sur. Minnesota, pp. 75, 76.

1889. Pachydictya acuta. Ulrich, Contr. Micro-Pal. Cambro-Sil., Part II, p. 44.

1893. Pachydictya acuta. Ulrich, Geol. Minnesota, III, p. 155, pl. viii, 11–17, pl. ix, 7.

1897. Pachydictya acuta. Whiteaves, Pal. Foss, III, p. 161.

Stictopora or Pachydictya acuta (in part), of various authors.

Trenton: Trenton Falls and other localities in New York; Burgin, Kentucky; Decorah, Iowa; various localities in Minnesota; St. Andrews, Manitoba.

Pachydictya alcyone (Billings).

1866. Ptilodictya alcyone. Billings, Catal. Sil. Foss. Anticosti, p. 36.

Pachydictya alcyone (Billings)—Continued.

1893. Pachydictya alcyone. Ulrich, Geol. Minnesota, III, p. 146.
Anticosti: Anticosti Island.
Obs. This may prove a synonym for Pachydictya crassa (Hall).

Pachydictya arguta Ulrich. See Pachydictya crassa (Hall).

Pachydictya bifurcata (Hall).

1853. Eschara bifurcata. Van Cleve (Mss.).
1883. Stictopora bifurcata. Hall, Twelfth Ann. Rep. Indiana Geol. Nat. Hist., p. 267, pl. xiii, 3, 4.
1887. Pachydictya bifurcata. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 163; ibid., III, 1888, pl. xv, 9.
1895. Pachydictya bifurcata. Foerste, Geol. Sur. Ohio, VII, p. 599, pl. xxviii, 9.
Clinton: Dayton and Fair Haven, Ohio.

Pachydictya bifurcata-instabilis Foerste.

1887. Pachydictya bifurcata var. instabilis. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 164; ibid., III, 1888, pl. xv, 10.
1895. Pachydictya bifurcata var. instabilis. Foerste, Geol. Sur. Ohio, VII, p. 599, pl. xxviii, 10.
Clinton: Near New Carlisle, Ohio.

Pachydictya conciliatrix Ulrich. See Trigonodictya conciliatrix (Ulrich).

Pachydictya crassa (Hall).

1852. Stictopora crassa. Hall, Pal. New York, II, p. 45, pl. xviii, 4*a*–*c*.
1874. Ptilodictya crassa. Nicholson and Hinde, Canadian Jour., new ser., XIV, p. 142.
1875. Ptilodictya crassa. Nicholson, Pal. Province Ontario, p. 45.
1893. Pachydictya crassa. Ulrich, Geol. Minnesota, III, p. 147.
1866. Ptilodictya rustica. Billings, Catal. Sil. Foss. Anticosti, p. 36.
1893. Pachydictya rustica. Ulrich, Geol. Minnesota, III, p. 146.
1866. Ptilodictya arguta. Billings, Catal. Sil. Foss. Anticosti, p. 36.
1893. Pachydictya arguta. Ulrich, Geol. Minnesota, III, p. 146.
1887. Stictopora scitula. Hall and Simpson, Pal. New York, VI, pl. lxi, 24, 25.
1893. Pachydictya scitula. Ulrich, Geol. Minnesota, III, p. 147.
1889. Ptilodictya farctus. Foerste, Proc. Boston Soc. Nat. Hist., XXIV, p. 328, pl. vi, 31.
1895. Pachydictya farctus. Foerste, Geol. Sur. Ohio, VII, p. 599, pl. xxxi, 31.
1889. Ptilodictya rudis. Foerste, Proc. Boston Soc. Nat. Hist., XXIV, p. 329, pl. vi, 33.
1895. Pachydictya (Rhinidictya) rudis. Foerste, Geol. Sur. Ohio, VII, p. 599, pl. xxxi, 32, 33.
Clinton: Wayne County, New York; Eaton, Ohio; Flamborough and Dundas, Ontario.
Anticosti: Anticosti Island.
Niagara: Lockport, New York.
Obs. Though rather meager in details and varying as to the number of rows of apertures on the frond, there is substantial agreement in all the descriptions cited above. Evidently we have in this species a cosmopolitan form.

Pachydictya elegans Ulrich.

1893. Pachydictya elegans. Ulrich, Geol. Minnesota, III, p. 154, pl. viii, 18, 19, pl. ix, 8, 9.
Trenton: St. Paul, Minnesota; Decorah, Iowa.

Pachydictya emaciata Foerste.

1887. Pachydictya emaciata. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 62; ibid., III, 1888, pl. xv, 8.
1895. Pachydictya emaciata. Foerste Geol. Sur. Ohio, VII, p. 599, pl. xxviii, 8.
Clinton: Dayton, Ohio.

Pachydictya emarcescens Foerste. See **Ptilodictya expansa-emarcescens** (Foerste).

Pachydictya everetti Ulrich.

1890. Pachydictya everetti. Ulrich, Geol. Sur. Illinois, VIII, p. 523, pl. xxxiii, 1–1*f*.
Trenton (Stones River): Dixon, Illinois.

Pachydictya ? famelica (Foerste).

1889. Ptilodictya famelicus. Foerste, Proc. Boston Soc. Nat. Hist., XXIV, p. 329, pl. vi, 32.
Clinton: Eaton and Belfast, Ohio.

Pachydictya farctus Foerste. See Pachydictya crassa (Hall).

Pachydictya fenestelliformis (Nicholson).

1875. Ptilodictya fenestelliformis. Nicholson, Ann. Mag. Nat. Hist., ser. 4, XV, p. 181, pl. xiv, 5–5*b*.
1875. Ptilodictya fenestelliformis. Nicholson, Pal. Ohio, II, p. 263, pl. xxv, 8–8*b*.
1875. Ptilodictya fenestelliformis. Nicholson, Pal. Province Ontario, p. 14.
1882. Phænopora ? fenestelliformis. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, pl. viii, 8.
1890. Pachydictya fenestelliformis. Ulrich, Geol. Sur. Illinois, VIII, p. 256.
Cincinnati (Richmond): Blanchester and other localities in Ohio; Wilmington, Illinios; ? Peterborough, Canada (Nicholson).

Pachydictya fenestelliformis-corticula Ulrich.

1890. Pachydictya fenestelliformis var. corticula. Ulrich, Geol. Sur. Illinois, VIII, p. 526, pl. xxxi, 1.
Cincinnati (Richmond): Wilmington, Illinois.

Pachydictya fimbriata Ulrich.

1886. Pachydictya fimbriata. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Sur. Minnesota, p. 75.
1893. Pachydictya fimbriata. Ulrich, Geol. Minnesota, III, p. 152, pl. viii, 28–34, pl. ix. 13, 14.
Trenton (Black River): Minneapolis and St. Paul, Minnesota.

Pachydictya ? firma Ulrich.

1890. Pachydictya firma. Ulrich, Geol. Sur. Illinois, VIII, p. 525, pl. xxxi, 2–2*f*.
Cincinnati (Richmond): Wilmington, Illinois.

Pachydictya foliata Ulrich.

1886. Pachydictya foliata. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Sur. Minnesota, p. 73.
1893. Pachydictya foliata. Ulrich, Geol. Minnesota, III, p. 149, pl. ix, 1–5, pl. x, 5–10.
1896. Pachydictya foliata. Ulrich, Zittel's Textb. Pal. (Eng. ed.), fig. 470 (p. 283).
Trenton (Stones River): Minneapolis, St. Paul, Cannon Falls, Preston, and Fountain, Minnesota.

Pachydictya gigantea Ulrich.

1890. Pachydictya gigantea. Ulrich, Geol. Sur. Illinois, VIII, p. 524, pl. xxxi, 3–3*e*.
Cincinnati (Richmond): Wilmington, Illinois.

Pachydictya hexagonalis Ulrich.

1889. Pachydictya hexagonalis. Ulrich, Contr. Micro-Pal. Cambro-Sil., Part II, p. 42, pl. ix, 2-2*c*.
1895. Pachydictya hexagonalis. Whiteaves, Pal. Foss., III, p. 118.
Cincinnati (Richmond): Stony Mountain, Manitoba.

Pachydictya magnipora Ulrich.

1889. Pachydictya magnipora. Ulrich, Contr. Micro-Pal. Cambro-Sil., Part II. p. 43.
1897. Pachydictya magnipora. Whiteaves, Pal. Foss., III, p. 161.
Trenton: St. Andrews, Manitoba; Kenyon, Minnesota.

Pachydictya obesa Foerste.

1887. Pachydictya obesa. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 165; ibid., III, 1888, pl. xv, 12.
1895. Pachydictya obesa. Foerste, Geol. Sur. Ohio, VII, p. 599, pl. xxviii, 12.
Clinton: Dayton, Ohio.

Pachydictya occidentalis Ulrich.

1886. Pachydictya occidentalis. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Sur. Minnesota, p. 75.
1893. Pachydictya occidentalis. Ulrich, Geol. Minnesota, III, p. 151, pl. viii, 20-27, pl. ix, 6-10.
Trenton (Black River): St. Paul and Goodhue County, Minnesota.

Pachydictya pumila Ulrich.

1890. Pachydictya pumila. Ulrich, Jour. Cincinnati Soc. Nat. Hist., XII, p. 186, fig. 11.
1893. Pachydictya pumila. Ulrich, Geol. Minnesota, III, p. 157, pl. x, 1-4, pl. viii, 4, 5.
1890. Rhinidictya humilis. Ulrich, Jour. Cincinnati Soc. Nat. Hist., XII, p. 185, fig. 10.
Trenton: Cannon Falls, Minnesota; Trenton Falls, New York.

Pachydictya pumila-sublata Ulrich.

1893. Pachydictya pumila var. sublata. Ulrich, Geol. Minnesota, III, p. 158.
Trenton: Cannon Falls, Minnesota.

Pachydictya robusta Ulrich.

1882. Pachydictya robusta. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 173, pl. viii, 10*a*-*c*.
Trenton (Stones River): Knoxville, Tennessee.

Pachydictya (Rhinidictya) rudis Foerste. See Pachydictya crassa (Hall).

Pachydictya rustica Ulrich. See Pachydictya crassa (Hall).

Pachydictya scitula Ulrich. See Pachydictya crassa (Hall).

Pachydictya ? splendens Ulrich.

1890. Pachydictya splendens. Ulrich, Geol. Sur. Illinois, VIII, p. 523, pl. xxxi, 2*g*, pl. xxxii, 1-1*b*.
Cincinnati (Richmond): Wilmington, Illinois.

Pachydictya triserialis Ulrich.

1890. Pachydictya triserialis. Ulrich, Jour. Cincinnati Soc. Nat. Hist., XII, p. 187, fig. 12.
1893. Pachydictya triserialis. Ulrich, Geol. Minnesota, III, p. 159, pl. x, 11-14.
Trenton: Montreal, Canada.

Pachydictya turgida Foerste.

1887. Pachydictya turgida. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 164; ibid., III, 1888, pl. xv, 11.

1895. Pachydictya turgida. Foerste, Geol. Sur. Ohio, VII, p. 599, pl. xxviii, 11.

Clinton: Dayton and Fair Haven, Ohio.

Palæocoryne Duncan and Jenkins. Genotype: Palæocoryne scoticum Duncan and Jenkins.

1869. Palæocoryne. Duncan and Jenkins, Phil. Trans. Royal Soc. London, vol. 159, p. 693.

1873. Palæocoryne. Duncan, Quar. Jour. Geol. Soc. London, XXIX, p. 412.

1873. Palæocoryne. Etheridge, Jun., Mem. Geol. Sur. Scotland, explanation sheet 23, p. 96.

1874. Palæocoryne. Young and Young, Geol. Mag., Dec. 2, I, p. 422.

1879. Palæocoryne. Vine, Hardwicke's Science Gossip, XV, pp. 225, 247.

Obs. The authors of this genus considered it hydrozoal in its affinities, but there can be no doubt but that Young and Young were correct in considering the fossils to which the name was given (derived from the Carboniferous shales of Scotland) appendages or processes forming an integral part of the zoarium of Fenestella.

PALESCHARA Hall. Genotype: Paleschara incrustans Hall.

1874. Paleschara. Hall, Twenty-sixth Ann. Rep. New York State Museum, p. 107.

1882. Paleschara. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 157.

1887. Paleschara. Hall and Simpson, Pal. New York, VI, p. xviii.

1889. Paleschara. Miller, North American Geol. Pal., p. 313.

1899. Paleschara. Grabau, Bull. Buffalo Soc. Nat Sci., VI, p. 170.

Paleschara amplectens Hall. See Leptotrypa ? quadrangularis (Nicholson).

Paleschara ? aspera Hall. See Paleschara maculata (Hall).

Paleschara beani (James).

1878. Ceramopora ? beani. James, Paleontologist, No. 1, p. 5.

1884. Ceramopora ? beani. James, Jour. Cincinnati Soc. Nat. Hist., VII, p. 23, fig. 3–3*b*.

1888. Ceramopora ? beani. James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 37.

1888. Paleschara beani. Ulrich, American Geologist, I, p. 186.

Cincinnati (Utica and Richmond): Warren County, Ohio; Covington, Kentucky (Utica).

Paleschara bifoliata Hall. See Ptilodictya nebulosa (Hall).

Paleschara ?? bilateralis Hall.

1879. Paleschara ? bilateralis. Hall, Thirty-second Ann. Rep. New York State Museum, p. 160 (reprint, 1880, p. 22).

1883. Paleschara ? bilateralis. Hall, Rep. State Geologist New York for the year 1882, pl. xvi, 22, 23.

1887. Paleschara ? (Lichenalia ?) bilateralis. Hall and Simpson, Pal. New York, VI, p. 36, pl. xvi, 22, 23.

Lower Helderberg: Clarksville, New York.

Paleschara concentrica Hall and Simpson.

1883. Species undetermined. Hall, Rep. State Geologist New York for the year 1882, pl. xvi, 24.

Paleschara concentrica Hall and Simpson—Continued.

1887. Paleschara concentrica. Hall and Simpson, Pal. New York, VI, p. 67, pl. xvi, 24.

Lower Helderberg: Clarksville, New York.

Paleschara ? dissimilis (Hall).

1879. Lichenalia dissimilis. Hall, Thirty-second Ann. Rep. New York State Museum, p. 158 (reprint, 1880, p. 80).

1883. Lichenalia dissimilis. Hall, Rep. State Geologist New York for the year 1882, pl. xv, 10–13.

1887. Paleschara ? dissimilis. Hall and Simpson, Pal. New York, VI, p. 35, pl. xv, 10–13.

Lower Helderberg: Schoharie, New York.

Paleschara ? foliata Hall. See Ptilodictya nebulosa (Hall).

Paleschara ? incrassata Hall.

1879. Paleschara incrassata. Hall, Twenty-eighth Ann. Rep. New York State Museum (Museum edition), p. 121.

1882. Paleschara incrassata. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 246.

Niagara: Waldron, Indiana.

Paleschara incrustans Hall.

1874. Paleschara incrustans. Hall, Twenty-sixth Ann. Rep. New York State Museum, p. 107.

1879. Paleschara incrustans. Hall, Thirty-second Ann. Rep. New York State Museum, p. 160 (reprint, 1880, p. 22).

1883. Paleschara incrustans. Hall, Rep. State Geologist New York for the year 1882, pl. xvi, 15–21, ? 24.

1887. Paleschara incrustans. Hall and Simpson, Pal. New York, VI, p. 35, pl. xvi, 15–21.

1897. Paleschara incrustans. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xx, 1, 2.

Lower Helderberg: Clarksville, New York.

Paleschara ? intercella (Hall).

1883. Paleschara intercella. Hall, Trans. Albany Institute, X, p. 179 (abstract, 1881, p. 179).

1884. Paleschara intercella. Hall, Rep. State Geologist New York for the year 1883, p. 5.

1891. Paleschara intercella. Hall, Tenth Ann. Rep. State Geologist New York for the year 1890, p. 37; Forty-fourth Ann. Rep. New York State Museum, p. 67.

1899. Paleschara intercella. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 170.

Hamilton: York and Eighteen-Mile Creek, New York.

Paleschara ? maculata Hall.

1876. Paleschara maculata. Hall, Twenty-eighth Ann. Rep. New York State Museum (documentary edition), pl. viii, 9, 10; ibid. (Museum edition 1879), p. 121, pl. viii, 9–13.

1882. Paleschara maculata. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 246, pl. vii, 9–13.

1883. Leptotrypa maculata. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 158.

1876. Paleschara ? aspera. Hall, Twenty-eighth Ann. Rep. New York State Museum (documentary edition), pl. viii, 11–13.

Niagara: Waldron, Indiana.

Paleschara ? offula Hall.

1876. Paleschara offula. Hall, Twenty-eighth Ann. Rep. New York State Museum (documentary edition), pl. viii, 7, 8; ibid. (Museum edition, 1879), p. 120, pl. viii, 7, 8
1882. Paleschara offula. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 245, pl. vii, 7, 8.
1883. Leptotrypa offula. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 158.
Niagara: Waldron, Indiana.

Paleschara ? pertenuis Hall.

1883. Paleschara ? (Lichenalia?) pertenuis. Hall, Trans. Albany Institute, X, p. 179 (abstract, 1881, p. 179).
1884. Paleschara ?? (Lichenalia?) pertenuis. Hall, Rep. State Geologist New York for the year 1883, p. 7.
1891. Paleschara pertenuis. Hall, Tenth Ann. Rep. State Geologist New York for the year 1890, p. 37; Forty-fourth Ann. Rep. New York State Museum, p. 67.
Hamilton: Lodi Landing and Darien Center, New York.

Paleschara quadrangularis Whiteaves. See Leptrotrypa ? quadrangularis (Nicholson).

Paleschara ? radiata Hall.

1879. Paleschara ? radiata. Hall, Thirty-second Ann. Rep. New York State Museum, p. 160 (reprint, 1880, p. 22).
1883. Paleschara ? radiata. Hall, Rep. State Geologist New York for the year 1882, pl. xvi, 13, 14.
1887. Paleschara radiata. Hall and Simpson, Pal. New York, VI, p. 35, pl. xvi, 13, 14.
1897. Paleschara radiata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xx, 3.
Lower Helderberg: Clarksville, New York.

Paleschara ? reticulata Hall.

1883. Paleschara reticulata. Hall, Trans, Albany Institute, X, p. 179 (abstract, 1881, p. 179).
1884. Paleschara reticulata. Hall, Rep. State Geologist New York for the year 1883, p. 6.
1891. Paleschara reticulata. Hall, Tenth Ann. Rep. State Geologist New York for the year 1890, p. 38; Forty-fourth Ann. Rep. New York State Museum, p. 68.
1899. Paleschara reticulata. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 171, fig. 66.
Hamilton: York and Eighteen-Mile Creek, New York.

Paleschara ? sphærion Hall. See Leptotrypa ? sphærion (Hall).

Paleschara ? (Chætetes ?) sphærion Hall. See Leptotrypa ? sphærion (Hall).

Paleschara ? tenuis Hall and Simpson.

1887. Paleschara ? tenuis. Hall and Simpson, Pal. New York, VI. p. 36.
Lower Helderberg: Clarksville, New York.

Paleschara ? variacella Hall.

1883. Paleschara variacella. Hall, Trans. Albany Institute, X, p. 179 (abstract, 1881, p. 179).
1884. Paleschara variacella. Hall, Rep. State Geologist New York for the year 1883, p. 6.

Paleschara ? variacella Hall—Continued.

1891. Paleschara variacella. Hall, Rep. State Geologist New York for the year 1890, p. 39; Forty-fourth Ann. Rep. New York State Museum, p. 69.
Hamilton: York, New York.

PATELLIPORA Rominger. Genotype: Patellipora stellata Rominger.

1887. Patellipora. Rominger, Proc. Acad. Nat. Sci. Philadelphia, p. 11.
Obs. This genus can not be considered fully established, as no details have been made known concerning the internal structure of the type and only known species.

Patellipora stellata Rominger.

1887. Patellipora stellata. Rominger, Proc. Acad. Nat. Sci. Philadelphia, p. 11.
Obs. This species is founded upon three specimens discovered "in drift bowlders at Ann Arbor, associated with characteristic Corniferous limestone fossils in silicified conditions."

Penniretepora D'Orbigny.

1850. Penniretepora. D'Orbigny, Prodr. de Pal., I, p. 45.
1895. Penniretepora. Whidborne, Devon. Fauna England, (Pal. Soc. Publ.), II, pt. 4, p. 185.
Obs. This genus was never properly established.

PERONOPORA Nicholson. Genotype: Monticulipora frondosa Nicholson (not D'Orbigny)=Chætetes decipiens Rominger.

1881. Peronopora. Nicholson, Genus Monticulipora, pp. 102, 215.
1882. Peronopora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 153.
1886. Peronopora. Waagen and Wentzel, Pal. Indica, Ser. XIII, p. 875.
1890. Peronopora. Ulrich, Geol. Sur. Illinois, VIII, p. 370.
1896. Peronopora (in part). Zittel's Textb. Pal. (Engl. ed.), p. 104.
1896. Peronopora. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 272.

Peronopora compressa (Ulrich).

1879. Chætetes compressus. Ulrich, Jour. Cincinnati Soc. Nat. Hist., II, p. 27, pl. vii, 25–25*b*.
1882. Peronopora compressa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 244.
1894. Monticulipora compressa. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 75.
1882. Peronopora uniformis. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 244, pl. x, 8, 8*a*.
1895. Monticulipora uniformis. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 76.
Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.
Obs. Peronopora uniformis Ulrich is not a valid species, having been founded upon a phase of Peronopora compressa Ulrich in which the mesopores are reduced to a minimum. Other species of Peronopora exhibit this same characteristic.

Peronopora decipiens (Rominger).

1866. Chætetes decipiens. Rominger, Proc. Acad. Nat. Sci. Philadelphia, p. 116.
1882. Peronopora decipiens. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 244.
1874. Chætetes frondosus (not of D'Orbigny). Nicholson, Quar. Jour. Geol. Soc. London, XXX, p. 508, pl. xxx, 2–2*b*.
1875. Chætetes frondosus (not of D'Orbigny). Nicholson, Pal. Ohio, II, p. 208, pl. xxii, 1–1*b*.
1876. Chætetes frondosus (not of D'Orbigny). Nicholson, Ann. Mag. Nat. Hist., ser. 4, XVIII, p. 91, pl. v, 11, 11*a*.

Peronopora decipiens (Rominger)—Continued.

1881. Chætetes frondosus. Quenstedt, Roehren- und Sternkorallen, p. 73, pl. cxlvi, 3–5 (not 8).

1881. Monticulipora (Peronopora) frondosa (not of D'Orbigny). Nicholson, Genus Monticulipora, p. 216, figs. 46, 47, pl. v, 4, 4*a*, 5, 5*a*.

1888. Monticulipora frondosa (not of D'Orbigny). James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 17.

1895. Monticulipora frondosa (not of D'Orbigny). J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 72.

Cincinnati (Lorraine and Richmond): Madison and other localities in Indiana; various localities in Ohio, Kentucky, and Tennessee.

Peronopora vera Ulrich.

1888. Peronopora vera. Ulrich, American Geologist, II, p. 40.

Cincinnati (Utica): Cincinnati, Ohio, and vicinity.

Obs. This is a good species, but requires further description before the name can be considered valid.

PETALOTRYPA Ulrich. Genotype: Petalotrypa compressa Ulrich.

1890. Petalotrypa. Ulrich, Geol. Sur. Illinois, VIII, pp. 377, 453.

1889. Petalotrypa. (Ulrich, in press), Miller, North American Geol. Pal., p. 314.

1897. Petalotrypa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 582.

Petalotrypa compressa Ulrich.

1890. Petalotrypa compressa. Ulrich, Geol. Sur. Illinois, VIII, p. 454, pl. xlvi, 4–4*f*.

1897. Petalotrypa compressa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 157–159 (p. 582).

Hamilton: Davenport, Iowa; Rock Island, Illinois.

Petalotrypa delicata Ulrich.

1890. Petalotrypa delicata. Ulrich, Geol. Sur. Illinois, VIII, p. 454, pl. xlvi, 5–5*b*.

Hamilton: Buffalo, Iowa; Rock Island, Illinois.

PETIGOPORA Ulrich. Genotype: Petigopora gregaria Ulrich.

1882. Petigopora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 155.

1889. Petigopora. Ulrich, Contr. Micro-Pal. Cambro-Sil., Part II, p. 34.

1889. Petigopora. Miller, North American Geol. Pal., p. 314.

1890. Petigopora. Ulrich, Geol. Sur. Illinois, VIII, p. 372.

1896. Petigopora. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 274.

1897. Petigopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 563.

Petigopora asperula Ulrich.

1883. Petigopora asperula. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 157, pl. vi, 4–4*c*.

1886. Petigopora asperula. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Sur. Minnesota, p. 130.

1888. Monticulipora wetherbyi var. asperula. James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 24.

1895. Monticulipora asperula. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 81.

1897. Petigopora gregaria (in part). Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 129 (in part)(p. 564).

Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.

Petigopora gregaria Ulrich.

1883. Petigopora gregaria. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 155, pl. vii, 3–3c.
1896. Petigopora gregaria. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 124.
1897. Petigopora gregaria. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 129 (in part) (p. 564).
Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.

Petigopora petechialis (Nicholson).

1875. Chætetes petechialis. Nicholson, Pal. Ohio, II, p. 213, pl. xxii, 5, 5a.
1883. Petigopora petechialis. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 156.
1886. Petigopora petechialis. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Sur. Minnesota, p. 103.
1888. Monticulipora petechialis. James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 24.
1889. Petigopora petechialis. Miller, North American Geol. Pal., fig. 496 (p. 314).
1895. Monticulipora petechialis. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 85.
Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.

Petigopora scabiosa Ulrich.

1889. Petigopora scabiosa. Ulrich, Contr. Micro-Pal. Cambro Sil., Part II, p. 34.
1897. Petigopora scabiosa. Whiteaves, Pal. Foss., III, p. 116.
Cincinnati (Richmond): Stony Mountain, Manitoba.

PHACELOPORA Ulrich. Genotype: Phacelopora pertenuis Ulrich.

1890. Phacelopora. Ulrich, Geol. Sur. Illinois, VIII, p. 368.
1889. Phacelopora. (Ulrich, in press), Miller, North American Geol. Pal., p. 314.
1897. Phacelopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 600.

Phacelopora constricta Ulrich.

1890. Phacelopora constricta. Ulrich, Geol. Sur. Illinois, VIII, p. 406, pl. xxix, 2.
1897. Phacelopora constricta. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 209 (p. 600).
Trenton: Burgin, Kentucky.
Obs. Mr. Ulrich now regards this as the interior cast of some undetermined species of Helopora or Arthroclema.

Phacelopora pertenuis Ulrich.

1890. Phacelopora pertenuis. Ulrich, Geol. Sur. Illinois, VIII, p. 406, pl. xxix, 1–1c.
1894. Phacelopora pertenuis. Keyes, Missouri Geol. Sur., V, p. 13, pl. xxxiii, 3.
1897. Phacelopora pertenuis. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 207, 208 (p. 600).
Trenton: Thebes, Illinois.

PHÆNOPORA Hall. Genotype: Phænopora explanata Hall.

1852. Phænopora. Hall, Pal. New York, II, p. 46.
1882. Phænopora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 152.
1887. Phænopora. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 157.
1889. Phænopora. Miller, North American Geol. Pal., p. 314.
1890. Phænopora. Ulrich, Geol. Sur. Illinois, VIII, p. 392.

PHÆNOPORA Hall—Continued.

1893. Phænopora. Ulrich, Geol. Minnesota, III, p. 173.
1896. Phænopora. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 279.
1897. Phænopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 541.

Phænopora constellata Hall.

1852. Phænopora constellata. Hall, Pal. New York, II, p. 47, pl. xviii, *7a–e*.
1889. Phænopora constellata. Miller, North American Geol. Pal., fig. 497 (p. 314).
1890. Phænopora constellata. Ulrich, Geol. Sur. Illinois, VIII, fig. 12*a*, *b* (p. 392).
Clinton: Wayne County, New York; Hamilton, Ontario.

Phænopora ensiformis Hall.

1852. Phænopora ensiformis. Hall, Pal. New York, II, p. 48, pl. xviii, 8*a–c*.
1874. Phænopora ensiformis. Nicholson and Hinde, Canadian Jour., new ser., XIV, p. 142.
1875. Phænopora ensiformis. Nicholson, Pal. Province Ontario, p. 45, fig. 19, 2, 2*a*.
1882. Ptilodictya ensiformis. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 172.
1895. Phænopora ensiformis. Foerste, Geol. Sur. Ohio, VII, p. 598.
Clinton: Flamborough, Dundas, and Hamilton, Ontario.

Phænopora excellens (Billings).

1866. Ptilodictya excellens. Billings, Catal. Sil. Foss. Anticosti, p. 34.
1882. Stictoporella ? excellens. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 169.
1889. Phænopora excellens. Miller, North American Geol. Pal., p. 314.
Anticosti: Anticosti Island.
Obs. Compare Phænopora explanata Hall.

Phænopora expansa Hall and Whitfield.

1853. Eschara bipunctata. Van Cleve (MSS.).
1875. Phænopora (Ptilodictya) expansa. Hall and Whitfield, Pal. Ohio, II, p. 114, pl. v, 1.
1883. Ptilodictya expansa (in part). Hall, Twelfth Ann. Rep. Indiana Geol. Nat. Hist., p. 266. (Gives the original description, but pl. xii, 1, 2 is the Ptilodictya expansa, which see).
1890. Phænopora expansa. Ulrich, Geol. Sur. Illinois, VIII, fig. 12*c* (p. 392).
1895. Phænopora expansa. Foerste, Geol. Sur. Ohio, VII, p. 598, pl. xxix, 1.
1879. Ptilodictya platyphylla. James, Paleontologist, No. 3, p. 21.
1887. Phænopora platyphylla. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 157; ibid., III, 1888, pl. xvi, 1.
1883. Ptilodictya bipunctata. Hall, Twelfth Ann. Rep. Indiana Geol. Nat. Hist., p. 266, pl. xiii, 5.
Not Ptilodictya expansa. Foerste, Bull. Sci. Lab. Denison Univ., II, 1887, p. 155; ibid., III, 1888, pl. xv, 5; Proc. Boston Soc. Nat. Hist., XXIV, 1889, p. 327.
Clinton: Dayton and Clinton County, Ohio.

Phænopora (Ptilodictya) expansa Hall and Whitfield. See Phænopora expansa Hall and Whitfield.

Phænopora explanata Hall.

1852. Phænopora explanata. Hall, Pal. New York, II, p. 46, pl. xviii, 6*a–e*.
Clinton: Flamborough Head and Hamilton, Ontario.
Obs. See also Phænopora excellens (Billings).

Phænopora ? fenestelliformis Ulrich. See **Pachydictya fenestelliformis** (Nicholson).

Phænopora fimbriata (James).

1853. Eschara ramosa. Van Cleve (MSS.).
1878. Ptilodictya fimbriata. James, Paleontologist, No. 1, p. 8.
1887. Phænopora fimbriata. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 161; ibid., III, 1888, pl. xv, 7.
1889. Phænopora fimbriata. Foerste, Proc. Boston Soc. Nat. Hist., XXIV, p. 330.
1895. Phænopora fimbriata. Foerste, Geol. Sur. Ohio, VII, p. 599, pl. xxviii, 7.
1883. Stictopora vanclevii. Hall, Twelfth Ann. Rep. Indiana Geol. Nat. Hist., p. 268, pl. xiii, 1, 2.
Clinton: Clinton County, Belfast, and Dayton, Ohio.

Phænopora incipiens Ulrich.

1893. Phænopora incipiens. Ulrich, Geol. Minnesota, III, p. 174, pl. xiii, 14–17.
Trenton: Montreal, Canada; Chimney Point, Vermont; St. Paul, Minnesota.

Phænopora lirata (Hall).

1874. Escharopora lirata. Hall, Twenty-sixth Ann. Rep. New York State Museum, p. 100.
1879. Escharopora lirata. Hall, Thirty-second Ann. Rep. New York State Museum, p. 161 (reprint, 1880, p. 23).
1883. Escharopora (Ptilodictya) lirata (in part). Hall, Rep. State Geologist New York for the year 1882, pl. xvii, 1–6.
1887. Ptilodictya lirata. Hall and Simpson, Pal. New York, VI, p. 38, pl. xvii, 1–4, pl. xxiiiA, 20.
1897. Phænopora lirata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xv, 8.
Lower Helderberg: Clarksville, New York.

Phænopora magna (Hall and Whitfield).

1853. Eschara compressa. Van Cleve (MSS.).
1875. Stictopora magna. Hall and Whitfield, Pal. Ohio, II, p. 112, pl. v, 5, 6.
1887. Phænopora magna. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 159; ibid., III, 1888, pl. xv, 6, pl. xvi, 2.
1889. Phænopora magna. Foerste, Proc. Boston Soc. Nat. Hist., XXIV, p. 331.
1895. Phænopora magna. Foerste, Geol. Sur. Ohio, VII, p. 599, pl. xxviii, 6, pl. xxix, 2*a–c*.
1883. Stictopora compressa. Hall, Twelfth Ann. Rep. Indiana Geol. Nat. Hist., p. 267, pl. xiv, 3.
Clinton: Dayton and Belfast, Ohio.

Phænopora multifida (Hall).

1853. Eschara multifida. Van Cleve (MSS.)
1878. Ptilodictya sp. (?). James, Paleontologist, No. 1, p. 8. (Name P. Welshi suggested.)
1883. Stictopora multifida. Hall, Twelfth Ann. Rep. Indiana Geol. Nat. Hist., p. 268, pl. xiv, 4.
1887. Phænopora multifida. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 160; ibid., III, 1888, pl. xvi, 3.
1895. Phænopora multifida. Foerste, Geol. Sur. Ohio, VII, p. 599, pl. xxix, 3.
Clinton: Dayton, Ohio; Hanover, Ohio, Indiana.

Phænopora multipora Hall. See **Eurydictya multipora** (Hall).

Phænopora platyphylla Foerste. See Phænopora expansa Hall and Whitfield.

Phænopora punctata (Nicholson and Hinde).

1874. Ptilodictya ? punctata. Nicholson and Hinde, Canadian Jour., new ser., XIV, p. 143, fig. 1*a*–*b*.
1874. Ptilodictya ? punctata. Nicholson, Pal. Province Ontario, p. 46, fig. 20.
1893. Phænopora punctata. Ulrich, Geol. Minnesota, III, p. 174.
Clinton: Dundas, Ontario.

Phænopora superba (Billings).

1866. Ptilodictya superba. Billings, Catal. Sil. Foss. Anticosti, p. 35.
1893. Phænopora superba. Ulrich, Geol. Minnesota, III, p. 174.
Anticosti: Anticosti Island.

Phænopora tenuis (Hall).

1874. Escharopora tenuis. Hall, Twenty-sixth Ann. Rep. New York State Museum, p. 99.
1879. Escharopora tenuis. Hall, Thirty-second Ann. Rep. New York State Museum, p. 161 (reprint, 1880, p. 23).
1883. Escharopora (Ptilodictya) tenuis (in part). Hall, Rep. State Geologist New York for the year 1882, pl. xiii, 14; pl. xvii, 7–13.
1887. Ptilodictya tenuis. Hall and Simpson, Pal. New York, VI, p. 39, pl. xiii, 14; pl. xvii, 7–12; pl. xxiii A, 15.
1889. Phænopora tenuis. Miller, North American Geol. Pal., p. 315.
1897. Phænopora tenuis. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xv, 9, 10.
Lower Helderberg: Albany and Schoharie counties, New York.

Phænopora wilmingtonensis Ulrich.

1893. Phænopora wilmingtonensis. Ulrich, Geol. Minnesota, III, p. 175, pl. xiii, 22–26.
Cincinnati (Richmond): Wilmington, Illinois.

PHRACTOPORA Hall. Genotype: Phractopora cristata Hall.

1883. Phractopora. Hall, Trans. Albany Institute, X, p. 154 (abstract, 1881, p. 12).
1887. Phractopora. Hall and Simpson, Pal. New York, VI, p. xvii.
1889. Phractopora. Miller, North American Geol. Pal., p. 315.
1897. Phractopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 539.

Phractopora cristata Hall.

1883. Phractopora cristata. Hall, Trans. Albany Institute, X, p. 154 (abstract, 1881, p. 12).
1886. Phractopora cristata. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxxi, 36–38.
1887. Phractopora cristata. Hall and Simpson, Pal. New York, VI, p. 99, pl. xxxi, 36–38.
1897. Phractopora cristata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxiv, 11–13.
1886. Lichenalia (Phractopora) cristata var. lineata. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxxi, 34, 35.
1887. Phractopora cristata var. lineata. Hall and Simpson, Pal. New York, VI, p. 99, pl. xxxi, 34, 35.
1897. Phractopora lineata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxiv, 14.
Hamilton: Falls of the Ohio.

Phractopora cristata var. lineata Hall. See Phractopora cristata Hall.

Phractopora lineata Simpson. See Phractopora cristata Hall.

Phractopora megastoma (Ulrich).

1890. Glyptopora megastoma. Ulrich, Geol. Sur. Illinois, VIII, p. 518, pl. lxxviii, 5, 5*a*.
1888. Glyptopora megastoma. Ulrich, Bull. Denison Univ., IV, p. 83. (Not defined.)
1894. Glyptopora megastoma. Keyes, Missouri Geol. Sur., V, p. 21.
Keokuk: Warsaw and Nauvoo, Illinois; Keokuk and Bentonsport, Iowa.
Waverly: Sciotoville, Ohio.

Phractopora michelinia Simpson. See Glyptopora sagenella-lata Ulrich.

Phractopora pinnata (Ulrich).

1890. Glyptopora pinnata. Ulrich, Geol. Sur. Illinois, VIII, p. 156, pl. lxxviii, 2.
Burlington: Sagetown, Henderson County, Illinois.

Phractopora sagenella Simpson (not Prout). See Glyptopora michelinia (Prout).

Phractopora trifolia (Rominger).

1866. Fistulipora trifolia. Rominger, Proc. Acad. Nat. Sci. Philadelphia, p. 122.
1890. Prismopora trifolia. Ulrich, Geol. Sur. Illinois, VIII, p. 505, pl. lxxvii, 4-4*b*.
1894. Prismopora trifolia. Keyes, Missouri Geol. Surv., V, p. 18.
Keokuk: Lagrange, Missouri; Keokuk, Iowa; Warsaw, Illinois.

PHYLLODICTYA Ulrich. Genotype: Phyllodictya frondosa Ulrich.

1882. Phyllodictya. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 153.
1889. Phyllodictya. Miller, North American Geol. Pal., p. 315.
1890. Phyllodictya. Ulrich, Geol. Sur. Illinois, VIII, p. 390.
1893. Phyllodictya. Ulrich, Geol. Minnesota, III, p. 141.
1896. Phyllodictya. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 280.
1897. Phyllodictya. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 531.

Phyllodictya frondosa Ulrich.

1882. Phyllodictya frondosa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 174, pl. viii, 11-11*b*.
1893. Phyllodictya frondosa (?). Ulrich, Geol. Minnesota, III, p. 142.
1897. Phyllodictya frondosa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 88 (p. 531).
Trenton (Stones River): High Bridge and Frankfort, Kentucky; ? Minneapolis, Minnesota.

Phyllodictya varia Ulrich.

1893. Phyllodictya varia. Ulrich, Geol. Minnesota, III, p. 144, pl. xiv, 1-8.
Trenton (Black River): Minneapolis and Cannon Falls, Minnesota.

PHYLLOPORA King. Genotype: Gorgonia ehrenbergi Geinitz.

1849. Phyllopora. King, Ann. Mag. Nat. Hist., ser. 2, II, p. 389.
1850. Phyllopora. King, Mon. Permian Foss. England, p. 40.
1882. Phyllopora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 150.
1885. Phyllopora. Waagen and Pichl, Pal. Indica, Ser. XIII, pp. 774, 796.
1886. Phyllopora. Ulrich, Contr. American Pal., I, p. 5.
1889. Phyllopora. Miller, North American Geol. Pal., p. 315.

PHYLLOPORA King—Continued.

1885. Phyllopora. Simpson, Thirteenth Ann. Rep. State Geologist New York for the year 1893, pp. 718, 726; Forty-seventh Ann. Rep. New York State Museum, pp. 912, 920.

1896. Phyllopora. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 283.

1897. Phyllopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pp. 512, 520.

Phyllopora aspera Ulrich.

1890. Phyllopora aspera. Ulrich, Geol. Sur. Illinois, VIII, p. 613, pl. xliv, 5–5*b*.

Hamilton: Falls of the Ohio.

Phyllopora ? corticosa Ulrich. See Phylloporina corticosa (Ulrich).

Phyllopora ehrenbergi Swallow (not Geinitz).

1858. Phyllopora ehrenbergi. Swallow, Trans. St. Louis Acad. Sci., I, p. 180.

Lower Permian: Kansas.

Obs.—As no description was given, the form so identified can not be recognized.

Phyllopora superba Ulrich. See Reteporidra perundata (Hall).

Phyllopora variolata Ulrich. See Phylloporina variolata (Ulrich).

PHYLLOPORINA Ulrich. Genotype: Retepora Trentonensis Nicholson.

Retepora, as applied by various authors to Ordovician and Silurian anastomosing bryozoa (not Lamarck, 1801).

1847. Gorgonia (?). Hall, Pal. New York, I, pp. 16, 76 (not Linnæus, 1745).

1847. Intricaria. Hall, Pal. New York, I, p. 77.

1878. Intricaria. Miller and Dyer, Contr. Pal., No. 2, p. 7.

1850. Subretepora. D'Orbigny, Prodr. de Pal., I, p. 22.

1889. Subretepora. Miller, North American Geol. Pal., p. 326. (See Geol. Sur. Illinois, VIII, pp. 683, 687.)

1882. Phyllopora (in part). Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 150.

1886. Nov. Gen. (not named). Ulrich, Contr. American Pal., I, p. 5.

1887. Phylloporina. (Ulrich), Foerste, Bull. Sci. Lab. Denison Univ., II, p. 150.

1890. Phylloporina. Ulrich, Geol. Sur. Illinois, VIII, pp. 399, 639.

1893. Phylloporina. Ulrich, Geol. Minnesota, III, p. 208.

1896. Phylloporina. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 283.

Phylloporina angulata (Hall).

1852. Retepora angulata. Hall, Pal. New York, II, p. 49, pl. xix, 3*a*–*h*.

1875. Retepora angulata (?). Hall and Whitfield, Pal. Ohio, II, p. 111, pl. v. 2–4.

1882. Retepora angulata. Hall, Twelfth Ann. Rep. Indiana Geol. Nat. Hist., p. 269, pl. xiv, 1, 2.

1887. Phylloporina angulata. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 151; ibid., III, 1888, pl. xv, 1.

1889. Subretepora angulata. Miller, North American Geol. Pal., fig. 523 (p. 326).

1895. Phylloporina angulata. Foerste, Geol. Sur. Ohio, VII, p. 600, pl. xxviii, 1.

Clinton: Rochester and Sodus, New York; Flamborough, Canada; Dayton, Todds Fork, Fair Haven, and Centerville, Ohio.

Phylloporina aspera (Hall).

1847. Gorgonia ? aspera. Hall, Pal. New York, I, p. 16, pl. iv, 3*a*, *b*.

1889. Subretepora aspera. Miller, North American Geol. Pal., p. 326.

1890. Phylloporina aspera. Ulrich, Geol. Sur. Illinois, VIII, p. 332, pl. liii, 4–4*c*.

Chazy: Chazy, New York; Mingan, Canada.

Phylloporina asperato-striata (Hall).

1852. Retepora asperato-striata. Hall, Pal. New York, II, p. 161, pl. xlC, 2a-k.
1889. Subretepora asperato-striata. Miller, North American Geol. Pal., p. 326.
1890. Phylloporina asperato-striata. Ulrich, Geol. Sur. Illinois, VIII, p. 332, pl. liii, 5–5*b*.
Niagara: Lockport, New York.

Phylloporina clathrata (Miller and Dyer).

1878. Intricaria clathrata. Miller and Dyer, Contr. Pal., No. 2, p. 7, pl. iii, 5, 5*a*.
1889. Subretepora clathrata. Miller, North American Geol. Pal., p. 326.
1890. Phylloporina clathrata. Ulrich, Geol. Sur. Illinois, VIII, p. 639.
Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.

Phylloporina corticosa (Ulrich).

1886. Phyllopora ? corticosa. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Sur. Minnesota, p. 61.
1889. Subretepora corticosa. Miller, North American Geol. Pal., p. 326.
1890. Phylloporina corticosa. Ulrich, Geol. Sur. Illinois, VIII, p. 639, pl. liii, 3, 3*a*.
1893. Phylloporina corticosa. Ulrich, Geol. Minnesota, III, p. 212, pl. v, 1-10.
Trenton (Black River): Cannon Falls and St. Paul, Minnesota.

Phylloporina dawsoni Ulrich.

1890. Phylloporina dawsoni. Ulrich, Geol. Sur. Illinois, VIII, p. 331, pl. liv, 1-16.
1889. Subretepora dawsoni. (Ulrich, in press), Miller, North American Geol. Pal., p. 326.
Trenton: Montreal, Canada; Chimney Point, Vermont.

Phylloporina fenestrata (Hall).

1850. Retepora fenestrata. Hall, Third Ann. Rep. State Cabinet Nat. Hist., p. 178, pl. ii, 1*a–e*.
1889. Subretepora fenestrata. Miller, North American Geol. Pal., p. 326.
Trenton: Lowville, Lewis County, New York.

Phylloporina gracilis (Hall).

1847. Retepora gracilis. Hall, Pal. New York, I, p. 15, pl. iv, 2, 2*a*.
1389. Subretepora gracilis. Miller, North American Geol. Pal., p. 326.
Chazy: Chazy, New York.

Phylloporina granistriata Ulrich.

1890. Phylloporina granistriata. Ulrich, Geol. Sur. Illinois, VIII, p. 639, pl. xxix, 3, 3*a*.
Trenton: Alexander County, Illinois; Lexington, Kentucky.

Phylloporina halli Ulrich.

1890. Phylloporina halli. Ulrich, Jour. Cincinnati Soc. Nat. Hist., XII, p. 181, fig. 7.
1893. Phylloporina halli. Geol. Minnesota, III, p. 211, pl. iv, 16–21.
Trenton (Black River): St. Paul, Minnesota.

Phylloporina incepta (Hall).

1847. Retepora incepta. Hall, Pal. New York, I, p. 15, pl. iv, 1*a*, *b*.
1889. Subretepora incepta. Miller, North American Geol. Pal., p. 326.
Chazy: Galway, Saratoga County, New York.

Phylloporina reticulata (Hall).

1847. Intricaria ? reticulata. Hall, Pal. New York, I, p. 77, pl. xxvi, 8*a–c*.
1889. Subretepora reticulata. Miller, North American Geol. Pal., p. 326, fig. 524.
1890. Phylloporina reticulata. Geol. Sur. Illinois, VIII, pp. 332, 639, pl. liii, 2, 2*a*.

Phylloporina reticulata (Hall)—Continued.

1893. Phylloporina reticulata. Geol. Minnesota, III, p. 210, pl. iv, 8–15.
Trenton (Black River and Trenton): Watertown, New York; various localities in New York, Vermont, Minnesota and Canada.

Phylloporina sublaxa Ulrich.

1890. Phylloporina sublaxa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., XII, p. 179, fig. 6.
1893. Phylloporina sublaxa. Ulrich, Geol. Minnesota, III, p. 209, pl. iv, 1–7.
Trenton (Stones River): Minneapolis, Minnesota; Lebanon, Lavergne and Murfreesboro, Tennessee.

Phylloporina trentonensis (Nicholson).

1875. Retepora Trentonensis. Nicholson, Geol. Mag., new ser., II, p. 37, pl. ii, 4–4*b*.
1875. Retepora Trentonensis. Nicholson, Pal. Province Ontario, p. 15, pl. ii, 4–4*b*.
1889. Phylloporina trentonensis. Ulrich, Contr. Micro-Pal. Cambro-Sil., Part II, p. 47.
1889. Subretepora trentonensis. Miller, North American Geol. Pal., p. 326.
1890. Phylloporina trentonensis. Ulrich, Geol. Sur. Illinois, VIII, p. 640, pl. liii, 1–1*c*.
1897. Phylloporina trentonensis. Whiteaves, Pal. Foss., III, p. 162.
Trenton: Peterborough, Ontario; St. Andrews, Manitoba.

Phylloporina variolata (Ulrich).

1882. Phyllopora variolata. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 160, pl. vi, 14.
1889. Subretepora variolata. Miller, North American Geol. Pal., p. 326.
1890. Phylloporina variolata. Ulrich, Geol. Sur. Illinois, VIII, p. 639.
Cincinnati (Utica): Cincinnati, Ohio, and vicinity.

Pileotrypa Hall. See Eridopora Ulrich.

Pileotrypa bistriata Simpson. See **Buskopora bistriata** (Hall).

Pileotrypa clivulata Simpson. See **Eridopora ? clivulata** (Hall).

Pileotrypa denticulata Simpson. See **Eridopora denticulata** (Hall).

Pileotrypa geometrica Simpson. See **Fistulipora geometrica** (Hall).

Pileotrypa granifera Simpson. See **Fistulipora granifera** (Hall).

Pileotrypa pyriformis Simpson. See **Buskopora pyriformis** (Hall).

PINACOTRYPA Ulrich. Genotype: **Fistulipora elegans** Rominger.

1890. Pinacotrypa. Ulrich, Geol. Sur. Illinois, VIII, p. 384.
1889. Pinacotrypa. (Ulrich, in press), Miller, North American Geol. Pal., p. 315.
1897. Pinacotrypa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 555.
1897. Fistuliporina. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 555.
1899. Fistuliporina. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 168.
1897. Fistulicella. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 606.
1899. Fistulicella. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 167.

Pinacotrypa elegans (Rominger).

1866. Fistulipora elegans. Rominger, Proc. Acad. Nat. Sci. Philadelphia, p. 122.
1890. Pinacotrypa elegans. Ulrich, Geol. Sur. Illinois, VIII, p. 385.

Pinacotrypa elegans (Rominger)—Continued.

1898. Pinacotrypa elegans. Whiteaves, Contr. Canadian Pal., I, p. 381.

1879. Fistulipora proporoides. Nicholson, Pal. Tabulate Corals, p. 310, fig. 41, pl. xv, 2, *2a*.

Hamilton: Hamburg and Canandaigua, New York.

Obs. Some of the Hamilton forms described by Hall will undoubtedly prove to be synonyms of this species.

Pinacotrypa marginata Whiteaves.

1892. Pinacotrypa marginata. Whiteaves, Contr. Canadian Pal., I, p. 278, pl. xxxvi, 1–*1b*.

Devonian [Hamilton?]: Lake Winnepegosis, Manitoba.

Pinacotrypa operculata (Hall and Simpson).

1887. Lichenalia operculata. Hall and Simpson, Pal. New York, VI, p. 205.

1888. Lichenalia operculata. Hall, Seventh Ann. Rep. State Geologist New York for the year 1887, pl. xv, 7; Forty-first Ann. Rep. New York State Museum, pl. xv, 7.

1897. Fistulipora operculata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxii, 13.

Hamilton: York and near Le Roy, New York.

Pinacotrypa plana (Hall).

1883. Thallostigma plana. Hall, Trans. Albany Institute, X, p. 187 (abstract, 1881, p. 187).

1884. Thallostigma plana. Hall, Rep. State Geologist New York for the year 1883, p. 30.

1887. Fistulipora plana. Hall and Simpson, Pal. New York, VI, p. 215, pl. lviii, 19, 20.

1897. Fistulicella plana. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxii, 4.

1899. Fistulicella plana. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 167, fig. 60.

Hamilton: Darien Center and Eighteen-Mile Creek, New York.

Pinacotrypa serrulata (Hall).

1883. Thallostigma serrulata. Hall, Trans. Albany Institute, X, p. 185 (abstract, 1881, p. 185).

1884. Thallostigma serrulata. Hall, Rep. State Geologist New York for the year 1883, p. 20.

1887. Fistulipora serrulata. Hall and Simpson, Pal. New York, VI, p. 214, pl. lviii, 6–8.

1897. Fistuliporina serrulata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxi, 15.

Hamilton: West Bloomfield, New York.

Pinacotrypa stellata (Hall).

1883. Lichenalia stellata. Hall, Trans. Albany Institute, X, p. 183 (abstract, 1881, p. 183).

1884. Lichenalia stellata. Hall, Rep. State Geologist New York for the year 1883, p. 33.

1887. Lichenalia stellata. Hall and Simpson, Pal. New York, VI, p. 195, pl. lviii, 15, 16.

1897. Fistuliporina stellata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxi, 9.

1898. Lichenalia stellata. Whiteaves, Contr. Canadian Pal., I, p. 380.

1899. Lichenalia stellata. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 171, fig. 66 A.

Hamilton: West Bloomfield and Eighteen-Mile Creek, New York.

Pinacotrypa variapora (Hall).

1883. Thallostigma variapora. Hall, Trans. Albany Institute, X, p. 184 (abstract, 1881, p. 184).
1884. Thallostigma variapora. Hall, Rep. State Geologist New York for the year 1883, p. 18.
1887. Fistulipora variapora. Hall and Simpson, Pal. New York, VI, p. 210, pl. lviii, 9-14.
1897. Fistuliporina variopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxi, 10.
1898. Fistulipora variapora. Whiteaves, Contr. Canadian Pal., I, p. 380.
Hamilton: West Williams, Ontario; York and shore of Lake Canandaigua, New York.

Pinnaporella Simpson (1895). See Ptiloporina Hall.

Pinnaporella Simpson (1897). See Ptiloporella Hall.

Pinnaporina Simpson. See Ptiloporina Hall.

Pinnaporina pinnata Simpson. See Ptiloporina pinnata (Hall).

PINNATOPORA Vine. Genotype: Glauconome elegans Young and Young.

1883. Pinnatopora. Vine, Rep. Brit. Assoc. Adv. Sci., LIII, p. 191.
1884. Pinnatopora. Vine, Quar. Jour. Geol. Soc. London, XL, p. 330.
1884. Pinnatopora. Shrubsole, Proc. Chester Soc. Nat. Hist., p. 100.
1885. Pinnatopora. Vine, Proc. Yorkshire Geol. Polyt. Soc., IX, p. 78.
1886. Pinnatopora. Ulrich, Contr. American Pal., I, p. 6.
1890. Pinnatopora. Ulrich, Geol. Sur. Illinois, VIII, pp. 397, 614.
1896. Pinnatopora. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 283.
Glauconome of various authors.
1887. Glauconome (not of Goldfuss or Lonsdale). Hall and Simpson, Pal. New York, VI, p. xxiv.
1887. Glauconome (not of Goldfuss or Lonsdale). Foerste, Bull. Sci. Lab. Denison Univ., II, p. 78.
1897. Glauconome (not of Goldfuss or Lonsdale). Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 524.
1899. Glauconome (not of Goldfuss or Lonsdale). Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 176.

Pinnatopora bellula Ulrich.

1890. Pinnatopora bellula. Ulrich, Geol. Sur. Illinois, VIII, p. 619, pl. lxvi, 8-8*b*.
Base of Coal Measures: Seville, Illinois.

Pinnatopora carinata (Hall).

1883. Glauconome carinata. Hall, Trans. Albany Institute, X, p. 196 (abstract, 1881, p. 196).
1884. Glauconome carinata. Hall, Rep. State Geologist New York for the year 1883, p. 60.
1887. Glauconome carinata. Hall and Simpson, Pal. New York, VI, p. 273, pl. lxvi, 23, 24.
1897. Glauconome carinata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. viii, 14, 15.
1899. Glauconome carinata. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 177, fig. 74.
Hamilton: Eighteen-Mile Creek, Erie and Ontario counties, New York.

Pinnatopora conferta Ulrich.

1890. Pinnatopora conferta. Ulrich, Geol. Sur. Illinois, VIII, p. 618, pl. lvi, 5, pl. lxvi, 6.
1894. Pinnatopora conferta. Keyes, Missouri Geol. Sur., V, p. 31.
Keokuk: Keokuk and Bentonsport, Iowa; Jersey County, Illinois.

Pinnatopora curvata Ulrich.

1888. Pinnatopora curvata. Ulrich, Bull. Denison Univ., IV, p. 76, pl. xiv, 4.
Waverly: Richfield, Ohio.

Pinnatopora flexuosa Ulrich.

1890. Pinnatopora flexuosa. Ulrich, Geol. Sur. Illinois, VIII, p. 617, pl. lxvi, 4–4*c*.
Keokuk: Kings Mountain, Kentucky.

Pinnatopora intermedia Ulrich.

1888. Pinnatopora intermedia. Ulrich, Bull. Denison Univ., IV, p. 74, pl. xiv, 1.
Waverly: Richfield, Ohio.

Pinnatopora minor Ulrich.

1888. Pinnatopora minor. Ulrich, Bull. Denison Univ., IV, p. 77, pl. xiv, 7, 7*a*.
Waverly: Richfield, Ohio.

Pinnatopora nereidis (White).

1874. Glauconome nereidis. White, Prel. Rep. Invert. Foss., p. 18.
1877. Glauconome nereidis. White, Wheeler's U. S. Geol. Sur., IV, p. 105, pl. vii, 5*a*–*e*.
Carboniferous: Confluence White Mountain and Black rivers, Arizona.

Pinnatopora nodata (Hall).

1883. Glauconome nodata. Hall, Trans. Albany Institute, X, p. 160 (abstract, 1881, p. 18).
1883. Glauconome nodata. Hall, Rep. State Geologist New York for the year 1882, pl. xxvi, 13, 14.
1887. Glauconome nodata. Hall and Simpson, Pal. New York, VI, p. 102, pl. xxxiii, 13, 14.
Upper Helderberg: Near Le Roy, New York.

Pinnatopora simulatrix Ulrich.

1888. Pinnatopora simulatrix. Ulrich, Bull. Denison Univ., IV, p. 75, pl. xiv, 3.
Waverly: Richfield, Ohio.

Pinnatopora sinuosa (Hall).

1883. Glauconome sinuosa. Hall, Trans. Albany Institute, X, p. 160 (abstract, 1881, p. 18).
1883. Glauconome sinuosa. Hall, Rep. State Geologist New York for the year 1882, pl. xxvi, 11, 12.
1887. Glauconome sinuosa. Hall and Simpson, Pal. New York, VI, p. 101, pl. xxxiii, 11, 12.
1897. Glauconome sinuosa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. viii, 8–10.
Upper Helderberg: Near Buffalo, New York.

Pinnatopora striata Ulrich.

1890. Pinnatopora striata Ulrich. Geol. Sur. Illinois, VIII, p. 617, pl. lxvi, 4*d*.
Keokuk: Bentonsport, Iowa.

Pinnatopora subangulata Ulrich.

1888. Pinnatopora subangulata. Ulrich, Bull. Denison Univ., IV, p. 76, pl. xiv, 2.
Waverly: Cuyahoga Falls, Ohio.

Pinnatopora tenuiramosa Ulrich.

1888. Pinnatopora tenuiramosa. Ulrich, Bull. Denison Univ., IV, p. 79.
1890. Pinnatopora tenuiramosa. Ulrich, Geol. Sur. Illinois, VIII, p. 619, pl. lxvi, 7.
Waverly: Richfield, Ohio.

Pinnatopora tenuistriata (Hall).

1883. Glauconome tenuistriatus. Hall, Trans. Albany Institute, X, p. 160 (abstract, 1881, p. 19).
1883. Glauconome tenuistriatus. Hall, Rep. State Geologist New York for the year 1882, pl. xxvi, 15–19.
1887. Glauconome tenuistriatus. Hall and Simpson, Pal. New York, VI, p. 102, pl. xxxiii, 15–19.
1897. Glauconome tenuistriatus. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. viii, 11–13.
Upper Helderberg: Near Buffalo, New York.

Pinnatopora trilineata (Meek).

1872. Glauconome trilineata. Meek, Pal. Eastern Nebraska, p. 157, pl. vii, 4*a*–*d*.
1890. Pinnatopora trilineata. Ulrich, Geol. Sur. Illinois, VIII, p. 620, pl. lvi, 6.
1894. Pinnatopora trilineata. Keyes, Missouri Geol. Sur., V, p. 31.
Upper Coal Measures: Nebraska City, Nebraska; Sangamon County, Illinois; Kansas City, Missouri.

Pinnatopora vinei Ulrich.

1888. Pinnatopora vinei. Ulrich, Bull. Denison Univ., IV, p. 77, pl. xiv, 5.
1890. Pinnatopora vinei. Ulrich, Geol. Sur. Illinois, VIII, p. 616, pl. lxvi, 5–5*b*.
1894. Pinnatopora vinei. Keyes, Missouri Geol. Sur., V, p. 31.
Waverly: Richfield, Ohio.
Keokuk: Keokuk, Iowa; Kings Mountain, Kentucky.

Pinnatopora whitei Foerste.

1887. Glauconome whitii. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 78.
1887. Pinnatopora whitii. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 87, pl. vii, 4*a*–*c*.
Coal Measures: Flint Ridge, Ohio.

Pinnatopora youngi Ulrich.

1888. Pinnatopora youngi. Ulrich, Bull. Denison Univ., IV, p. 78, pl. xiv, 6, 6*a*.
1890. Pinnatopora youngi. Ulrich, Geol. Sur. Illinois, VIII, p. 615, pl. lxvi, 3.
1894. Pinnatopora youngi. Keyes, Missouri Geol. Sur., V, p. 31.
Waverly: Richfield and Lodi, Ohio.
Keokuk: Keokuk, Iowa; King's Mountain, Kentucky.

POLYPORA McCoy. Genotype: Polypora dendroides McCoy.

1845. Polypora. McCoy, Synopsis Carbon. Foss. Ireland, p. 206.
1850. Polypora. D'Orbigny, Prodr. de Paleontologie, I, p. 45.
1852. Polypora. Hall, Pal. New York, II, p. 167.
1854. Polypora. McCoy, Brit. Pal. Foss., p. 115.
1860. Polypora. Eichwald, Lethæa Rossica, I, p. 372.
1874. Polypora. Nicholson, Pal. Province, Ontario, p. 98.
1875. Polypora. Etheridge, Jun., Proc. Geol. Assoc., IV, p. 120.
1881. Polypora. Vine, Rep. British Assoc. Adv. Sci., p. 170.
1882. Polypora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 150.
1883. Polypora. Claypole, Quar. Jour. Geol. Soc. London, XXXIX, p. 31.
1885. Polypora. Hall, Rep. State Geologist New York for the year 1884, p. 35.
1885. Polypora. Vine, Proc. Yorkshire Geol. Polyt. Soc., IX, p. 86.
1885. Polypora. Waagen and Pichl, Pal. Indica, Ser. XIII, pp. 774, 781.

POLYPORA McCoy—Continued.

1886. Polypora. Ulrich, Contr. American Pal., I, p. 5.
1887. Polypora. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 82.
1887. Polypora. Hall and Simpson, Pal. New York, VI, p. xxiv.
1889. Polypora. Miller, North American Geol. Pal., p. 315.
1890. Polypora. Ulrich, Geol. Sur. Illinois, VIII, pp. 396, 585.
1894. Polypora. Počta, Syst. Sil. Bohême, VIII, t. I, p. 84.
1895. Polypora. Simpson, Thirteenth Ann. Rep. State Geologist New York for the year 1893, pp. 699, 724; Forty-seventh Ann. Rep. New York State Museum, pp. 893, 918.
1895. Polypora. Whidborne, Devon. Fauna England, (Pal. Soc. Pub., XLIX), II, Part 4, p. 174.
1896. Polypora. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 282.
1897. Polypora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pp. 502, 520.
1899. Polypora. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 162.
1895. Polyporella. Simpson, Thirteenth Ann. Rep. State Geologist New York for the year 1893, pp. 700, 725; Forty-seventh Ann. Rep. New York State Museum, pp. 894, 919.
1897. Polyporella. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pp. 502, 520.
1895. Flabelliporella. Simpson, Thirteenth Ann. Rep. State Geologist New York for the year 1893, pp. 703, 725; Forty-seventh Ann. Rep. New York State Museum, pp. 897, 919.
1897. Flabelliporella. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894; pp. 502, 521.
1876. Protoretepora. De Koninck, Rech. sur les Foss. Pal. de la Nouv. Galles du Sud, III, p. 176; 1898, Engl. translation, Mem. Geol. Sur. New South Wales, Pal. No. 6, p. 136.

Polypora aculeata (Hall).

1883. Fenestella aculeata. Hall, Trans. Albany Institute, X, p. 163 (abstract, 1881, p. 21).
1883. Fenestella (Polypora) aculeata. Hall, Rep. State Geologist New York for the year 1882, pl. xxviii, 5–7.
1886. Fenestella (Polypora) aculeata. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xl, 6–11.
1887. Fenestella (Polypora) aculeata. Hall and Simpson, Pal. New York, VI, p. 157, pl. xxxv, 5–7, pl. xl, 6–11.
Hamilton: Falls of the Ohio.

Polypora albionensis Spencer. Recognizable?

1884. Polypora (Fenestella?) albionensis. Spencer, Trans. St. Louis Acad. Sci. IV, p. 605, pl. vii, 5, 5*a*.
1884. Polypora (Fenestella?) albionensis. Spencer, Bull. Museum Univ. State Missouri, I, p. 55, pl. vii, 5, 5*a*.
Niagara: Six miles east of Hamilton, Ontario.

Polypora approximata Ulrich.

1859. Polypora biarmica (not of Keyserling). Prout, Trans. St. Louis Acad. Sci., I, p. 450.
1890. Polypora approximata. Ulrich, Geol. Sur. Illinois, VIII, p. 599, pl. lxi, 5, 5*a*.
Chester: Chester, Illinois; Sloans Valley and Litchfield, Kentucky.

Polypora arkonensis Miller.

1874. Polypora tuberculata (not of Prout). Nicholson, Geol. Mag., new ser., I, p. 162, pl. ix, 20.
1874. Polypora tuberculata (not of Prout). Nicholson, Pal. Province Ontario, p. 100, fig. 37*a–c*.
1883. Polypora arkonensis. Miller, American Pal. Foss., edition 2, p. 292.
1898. Polypora Arkonensis. Whiteaves, Contr. Canadian Pal., I, p. 379.
Hamilton: Arkona, Ontario.

Polypora arta (Hall).

1879. Fenestella Arta. Hall, Thirty-second Ann. Rep. New York State Museum, p. 163 (reprint, 1880, p. 25).
1883. Fenestella Arta. Hall, Rep. State Geologist New York for the year 1882, pl. xviii, 4–9 (in part).
1887. Fenestella (Polypora) Arta. Hall and Simpson, Pal. New York, VI, p. 63, pl. xviii, 4–7.
1888. Fenestella (Polypora) Arta. Hall, Seventh Ann. Rep. State Geologist New York for the year 1887, pl. xiv, 1–3; Forty-first Ann. Rep. New York State Museum, pl. xiv, 1–3.
Lower Helderberg: Catskill Creek, New York.

Polypora aspectans (Hall).

1884. Fenestella aspectus. Hall, Thirty-sixth Ann. Rep. New York State Museum, p. 59.
1885. Polypora aspectans. Hall, Rep. State Geologist New York for the year 1884, pl. i, 4.
1887. Fenestella (Polypora) aspectans. Hall, Sixth Ann. Rep. State Geologist New York for the year 1886, p. 65.
1888. Fenestella (Polypora) aspectans. Hall, Seventh Ann. Rep. State Geologist New York for the year 1887, pl. xiii, 10–14; Forty-first Ann. Rep. New York State Museum, pl. xiii, 10–14.
1897. Polypora aspectans. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. i, 12, 13.
Hamilton: Bellona, New York.

Polypora biarmica Prout (not of Keyserling). See Polypora approximata Ulrich.

Polypora biseriata Ulrich.

1890. Polypora biseriata. Ulrich, Geol. Sur. Illinois, VIII, p. 592, fig. 5*d* (p. 315), pl. lx, 4–4*b*.
1894. Polypora biseriata (?). Keyes, Missouri Geol. Sur., V, p. 29.
Warsaw: Warsaw and Monroe County, Illinois; Barrett Station, Missouri (Keyes).

Polypora blandida Ulrich.

1886. Polypora blandida. Ulrich, Contr. American Pal., I, p. 18, pl. ii, 3, 3*a*.
Hamilton: Falls of the Ohio.

Polypora brevisulcata (Hall).

1883. Fenestella brevisulcata. Hall, Trans. Albany Institute, X, p. 168 (abstract, 1881, p. 26).
1886. Fenestella (Polypora) brevisulcata. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xl, 12–15.
1887. Fenestella (Polypora) brevisulcata. Hall and Simpson, Pal. New York, VI, p. 168, pl. xl, 12–15.
Upper Helderberg: Walpole, Ontario.

Polypora burlingtonensis Ulrich.

1890. Polypora burlingtonensis. Ulrich, Geol. Sur. Illinois, VIII, p. 587, pl. lix, 2, *2a*.

Burlington: Burlington, Iowa; Henderson County, Illinois.

Polypora carinella (Hall and Simpson).

1883. Fenestella (Polypora) n. sp. (?). Hall, Rep. State Geologist New York for the year 1882, pl. xxxiii, 1, 2.

1887. Fenestella (Polypora) carinella. Hall and Simpson, Pal. New York, VI, p. 153, pl. xlii, 1, 2.

Upper Helderberg: Near Buffalo, New York.

Polypora celsipora (Hall).

1883. Fenestella celsipora. Hall, Trans. Albany Institute, X, p. 165 (abstract, 1881, p. 24).

1883. Fenestella (Polypora) celsipora. Hall, Rep. State Geologist New York for the year 1882, pl. xxxiii, 5–8, ? 9, 10.

1886. Fenestella (Polypora) celsipora. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xli, 16–22, pl. xlii, 5–10.

1887. Fenestella (Polypora) celsipora. Hall and Simpson, Pal. New York, VI, p. 150, pl. xli, 16–22, pl. lii, 5–10.

Upper Helderberg: Walpole, Ontario.

Polypora celsipora-minima (Hall).

1883. Fenestella celsipora var. minima. Hall, Trans. Albany Institute, X, p. 166 (abstract, 1881, p. 24).

1883. Fenestella (Polypora) celsipora. Hall, Rep. State Geologist New York for the year 1882, pl. xxviii, 1–4.

1886. Fenestella (Polypora) celsipora var. minima. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xli, 11–13.

1887. Fenestella (Polypora) celsipora var. minima. Hall and Simpson, Pal. New York, VI, p. 151, pl. xxxv, 1–4, pl. xli, 11–13.

Hamilton: Falls of the Ohio.

Polypora celsipora-minor (Hall).

1883. Fenestella celsipora var. minor. Hall, Trans. Albany Institute, X, p. 166 (abstract, 1881, p. 24).

1886. Fenestella (Polypora) celsipora var. minor. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xli, 14, 15.

1887. Fenestella (Polypora) celsipora var. minor. Hall and Simpson, Pal. New York, VI, p. 151, pl. xli, 14, 15.

Upper Helderberg: Walpole, Ontario.

Polypora cestriensis Ulrich.

1890. Polypora cestriensis. Ulrich, Geol. Sur. Illinois, VIII, p. 594, pl. lv, 4–*4b*, pl. lx, 7–*7c*.

1894. Polypora cestriensis. Keyes, Missouri Geol. Sur., V, p. 29.

Chester: Chester, Kaskaskia, and near Anna, Illinois; Litchfield and Sloans Valley, Kentucky.

Polypora compacta (Hall).

1879. Fenestella compacta. Hall, Thirty-second Ann. Rep. New York State Museum, p. 163 (reprint, 1880, p. 25).

1883. Fenestella compacta. Hall, Rep. State Geologist New York for the year 1882, pl. xviii, 1–3.

1887. Fenestella (Polypora) compacta. Hall and Simpson, Pal. New York, VI, p. 63, pl. xviii, 1–3, pl. xxii, 4, 5.

Polypora compacta (Hall)—Continued.

1883. Fenestella (Hemitrypa) Nervia (in part). Hall, Rep. State Geologist New York for the year 1882, pl. xxii, 1-3.
Lower Helderberg: Clarksville, New York.

Polypora complanata Ulrich.

1890. Polypora complanata. Ulrich, Geol. Sur. Illinois, VIII, p. 597, pl. lx, 6-6c.
Chester: Chester, Illinois.

Polypora compressa (Hall).

1879. Fenestella compressa. Hall, Thirty-second Ann. Rep. New York State Museum, p. 164 (reprint, 1880, p. 26).
1887. Fenestella (Polypora) compressa. Hall and Simpson, Pal. New York, VI, p. 61, pl. xviii, 14-18.
1883. Fenestella planiramosa. Hall, Rep. State Geologist New York for the year 1882, pl. xviii, 14-18.
Lower Helderberg: Clarksville, New York.

Polypora conferta (Hall).

1883. Fenestella conferta. Hall, Trans. Albany Institute, X, p. 63 (abstract, 1879, p. 7).
1882. Fenestella conferta. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 252.
Niagara: Waldron, Indiana.

Polypora corticosa Ulrich.

1890. Polypora corticosa. Ulrich, Geol. Sur. Illinois, VIII, p. 596, pl. lx, 5-5c, pl. lxi, 1.
1894. Polypora corticosa. Keyes, Missouri Geol. Sur., V, p. 30.
Chester: Chester, Illinois.

Polypora crassa Ulrich.

1890. Polypora crassa. Ulrich, Geol. Sur. Illinois, VIII, p. 603, pl. lxi, 8, 8a.
Upper Coal Measures: Sugar Creek, Sangamon County, Illinois.

Polypora crebescens (Hall).

1886. Fenestella crebescens. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xlv, 20, 21.
1887. Fenestella (Polypora) crebescens. Hall and Simpson, Pal. New York, VI, p. 170, pl. xlv, 20, 21.
Upper Helderberg: Western New York.

Polypora cultellata Hall. See Polypora shumardi Prout.

Polypora cylindracea (Hall).

1883. Fenestella cylindracea. Hall, Trans. Albany Institute, X, p. 166 (abstract, 1881, p. 24).
Upper Helderberg: Near Buffalo, New York.

Polypora distans (Hall).

1883. Fenestella distans. Hall, Trans. Albany Institute, X, p. 165 (abstract, 1881, p. 23).
1883. Fenestella (Polypora) distans. Hall, Rep. State Geologist New York for the year 1882, pl. xxx, 2-5, ? 6-10, 15, 16.
1886. Fenestella distans. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xliv, 7.
1887. Fenestella (Polypora) distans. Hall and Simpson, Pal. New York, VI, p. 161, pl. xxxvii, 2-10, 15, 16, pl. xliv, 7.
Upper Helderberg: Near Buffalo, New York.

Polypora distincta Ulrich.

1890. Polypora distincta. Ulrich, Geol. Sur. Illinois, VIII, p. **603**, pl. **lxi**, 7, *7a*.
Upper Coal Measures: Springfield, Illinois.

Polypora elegans ? Hall. See Polypora idothea Hall.

Polypora elongata (Hall).

1883. Fenestella (Polypora) elongata. Hall, Rep. State Geologist New York for the year 1882, pl. xxxiii, 3, 4.
1887. Fenestella (Polypora) elongata. Hall and Simpson, Pal. New York, VI, p. 153, pl. xlii, 3, 4.
Upper Helderberg: Onondaga Valley, New York.

Polypora eudora (Hall).

1879. Fenestella Eudora. Hall, Thirty-second Ann. Rep. New York State Museum, p. 165 (reprint, 1880, p. 27).
1883. Fenestella Eudora. Hall, Rep. State Geologist New York for the year 1882, pl. xix, 3–10, ? 12.
1887. Fenestella (Polypora) Eudora. Hall and Simpson, Pal. New York, VI, p. 58, pl. **xix**, 3, 4, ? 5, 6–10.
Lower Helderberg: Clarksville, New York.

Polypora fastuosa Foerste (De Koninck ?).

1887. Polypora fastuosa De Koninck. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 82, pl. vii, *9a–d*.
Coal Measures: Flint Ridge and Bald Hill, Ohio.
Obs. It is very unlikely that Foerste's form is the species which De Koninck described under the name P. fastuosa.

Polypora fistulata (Hall).

1884. Fenestella fistulata. Hall, Thirty-sixth Ann. Rep. New York State Museum, p. 59.
1885. Fenestella fistulata. Hall, Rep. State Geologist New York for the year 1884, pl. i, 6.
1887. Fenestella (Polypora) fistulata. Hall, Sixth Ann. Rep. State Geologist New York for the year 1886, p. 64.
1888. Fenestella (Polypora) fistulata. Hall, Seventh Ann. Rep. State Geologist New York for the year 1887, pl. xii, 1–16; Forty-first Ann. Rep. New York State Museum, pl. xii, 1–16.
1895. Polyporella fistulata. Simpson, Thirteenth Ann. Rep. State Geologist New York for the year 1893, p. 700; Forty-seventh Ann. Rep. New York State Museum, p. 894.
1897. Polyporella fistulata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. i, 9, 10.
Hamilton: Genesee and Erie counties, New York; West Williams, Ontario.

Polypora flabelliformis (Hall).

1883. Fenestella flabelliformis. Hall, Trans. Albany Institute, X, p. 165 (abstract 1881, p. 23).
1883. Fenestella (Polypora) flabelliformis. Hall, Rep. State Geologist New York for the year 1882, pl. xxx, 11, 12.
1887. Fenestella (Polypora) flabelliformis. Hall and Simpson, Pal. New York, VI, p. 161, pl. xxxvii, 11, 12.
Upper Helderberg: Onondaga Valley, New York. In the Trans. Albany Institute, X, p. 165, the locality is given as Shortsville, near Manchester, New York.

Polypora ? gracilis Prout.

1860. Polypora gracilis. Prout, Trans. St. Louis Acad. Sci., I, p. 580.
1866. Polypora gracilis. Prout, Geol. Sur. Illinois, II, p. 422, pl. xxi, 1, 1*a*.
1888. Polypora gracilis. Ulrich, Bull. Denison Univ., IV, p. 73.
1890. Polypora ? gracilis. Ulrich, Geol. Sur. Illinois, VIII, p. 590, pl. lxi, 10, 10*a*.
1894. Polypora gracilis. Keyes, Missouri Geol. Sur., V, p. 28.
Keokuk: Warsaw and Nauvoo, Illinois; Keokuk, Iowa; Kings Mountain, Kentucky.
Waverly: Richfield and Sciotoville, Ohio.

Polypora granilinea (Hall).

1883. Fenestella granilinea. Hall, Trans. Albany Institute, X, p. 168 (abstract, 1881, p. 27).
1886. Fenestella (Polypora) granilinea. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xl, 20–23.
1887. Fenestella (Polypora) granilinea. Hall and Simpson, Pal. New York, VI, p. 154, pl. xl, 20–23.
Upper Helderberg: Walpole, Ontario.

Polypora halliana Prout.

1860. Polypora Halliana. Prout, Trans. St. Louis Acad. Sci., I, p. 580.
1866. Polypora Halliana. Prout, Geol. Sur. Illinois, II, p. 421, pl. xxi, 4–4*b*.
1876–7. Protoretepora (Polypora) Halliana. De Koninck, Rech. sur les Foss. Pal. de la Nouv. Galles du Sud, III, p. 179; 1898, English translation, Mem. Geol. Sur. New South Wales, Pal. No. 6, p. 137.
1890. Polypora halliana. Ulrich, Geol. Sur. Illinois, VIII, p. 587, pl. lix, 5–5*c*.
1894. Polypora halliana. Keyes, Missouri Geol. Sur., V, p. 28.
Keokuk and Warsaw: Warsaw, Illinois, and Keokuk, Iowa.

Polypora Halliana Nicholson (not Prout) = ?

1874. Polypora Halliana. Nicholson, Pal. Province Ontario, p. 99.
Upper Helderberg: Wainfleet, Ontario.

Polypora Hamiltonensis Prout. See Reteporina hamiltonensis (Prout).

Polypora hexagonalis (Hall).

1883. Fenestella hexagonalis. Hall, Trans. Albany Institute, X, p. 169 (abstract, 1881, p. 27).
1883. Fenestella (Polypora) hexagonalis. Hall, Rep. State Geologist New York for the year 1882, pl. xxxi, 14–20.
1887. Fenestella (Polypora) hexagonalis. Hall and Simpson, Pal. New York, VI, p. 164, pl. xxxiii, 14–20.
Upper Helderberg: Walpole, Ontario.

Polypora hexagonalis-foraminulosa (Hall).

1883. Fenestella hexagonalis var. foraminulosa. Hall, Trans. Albany Institute, X, p. 169 (abstract, 1881, p. 27).
1883. Fenestella (Polypora) hexagonalis var. foraminulosa. Hall, Rep. State Geologist New York for the year 1882, pl. xxxii, 16–20.
1887. Fenestella (Polypora) hexagonalis var. foraminulosa. Hall and Simpson, Pal. New York, VI, p. 165, pl. xxxix, 16–20.
Upper Helderberg: Walpole, Ontario.

Polypora idothea (Hall).

1874. Polypora elegans (?). Hall, Twenty-sixth Ann. Rep. New York State Museum, p. 97.
1879. Fenestella Idothea. Hall, Thirty-second Ann. Rep. New York State Museum, p. 166 (reprint, 1880, p. 28).

Polypora idothea (Hall)—Continued.

1883. Fenestella Idothea. Hall, Rep. State Geologist New York for the year 1882, pl. xix, 14, 15.

1887. Fenestella (Polypora) Idothea. Hall and Simpson, Pal. New York, VI, p. 60, pl. xix, 14, 15.

Lower Helderberg: Clarksville, New York.

Polypora imbricata Prout. Not recognizable.

1866. Polypora imbricata. Prout, Trans. St. Louis Acad. Sci., II, p. 412.

"Mountain Limestone:" Indiana.

Polypora impressa Ulrich.

1888. Polypora impressa. Ulrich, Bull. Denison Univ., IV, p. 72, pl. xiii, 8, 8*a*.

Waverly: Richfield, Ohio.

Polypora incepta Hall.

1852. Polypora incepta. Hall, Pal. New York, II, p. 167, pl. xlD, 5*a–f*.

1890. Polypora incepta (Hall?). Ulrich, Geol. Sur. Illinois, VIII, p. 358, pl. lv, 1.

Niagara: Lockport and Rochester, New York; Waldron, Indiana.

Polypora intermedia Prout.

1858. Polypora intermedia. Prout, Trans. St. Louis Acad. Sci., I, p. 272, pl. xv, 5, 5*a*.

Hamilton: Falls of the Ohio.

Polypora lævistriata (Hall).

1883. Fenestella (Polypora) lævistriata. Hall, Rep. State Geologist New York for the year 1882, pl. xxviii, 14–16.

1887. Fenestella (Polypora) lævistriata. Hall and Simpson, Pal. New York, VI, p. 159, pl. xxxv, 14–16.

Hamilton: Falls of the Ohio.

Polypora largissima (Hall).

1883. Fenestella largissima. Hall, Trans. Albany Institute, X, p. 164 (abstract, 1881, p. 22).

1883. Fenestella (Polypora) largissima. Hall, Rep. State Geologist New York for the year 1882, pl. xxvii, 8, 9.

1887. Fenestella (Polypora) largissima. Hall and Simpson, Pal. New York, VI, p. 156, pl. xxxiv, 8, 9.

Upper Helderberg: Central New York.

Polypora latitruncata (Hall).

1884. Fenestella latitruncata. Hall, Thirty-sixth Ann. Rep. New York State Museum, p. 58.

1887. Fenestella (Polypora) latitruncata. Hall, Sixth Ann. Rep. State Geologist New York for the year 1886, p. 68.

1888. Fenestella (Polypora) latitruncata. Hall, Seventh Ann. Rep. State Geologist New York for the year 1887, pl. xiii, 1–9; Forty-first Ann. Rep. New York State Museum, pl. xiii, 1–9.

Hamilton: Darien, New York; West Williams, Ontario.

Polypora levinodata (Hall).

1883. Fenestella levinodata. Hall, Trans. Albany Institute, X, p. 169 (abstract, 1881, p. 28).

1883. Fenestella (Polypora) levinodata. Hall, Rep. State Geologist New York for the year 1882, pl. xxxiii, 12–15.

1886. Fenestella (Polypora) levinodata. Hall and Simpson, Pal. New York, VI, p. 169, pl. xlii, 12–15.

Hamilton: Falls of the Ohio.

Polypora lilæa Hall.

1874. Polypora Lilia. Hall, Twenty-sixth Ann. Rep. New York State Museum, p. 96.
1879. Fenestella (Polypora) Lilæa. Hall, Thirty-second Ann. Rep. New York State Museum, p. 165 (reprint, 1880, p. 27).
1883. Fenestella (Polypora) Lilæa. Hall, Rep. State Geologist New York for the year 1882, pl. xviii, 19, 20.
1887. Fenestella (Polypora) Lilæa. Hall and Simpson, Pal. New York, VI, p. 62, pl. xviii, 19–22.
1883. Retepora n. sp. Hall, Rep. State Geologist New York for the year 1882, pl. xviii, 21, 22.

Lower Helderberg: Schoharie and Clarksville, New York.

Polypora maccoyana Ulrich.

1890. Polypora maccoyana. Ulrich, Geol. Sur. Illinois, VIII, p. 588, pl. lix, 3–3*d*.
1894. Polypora maccoyana. Keyes, Missouri Geol. Sur., V, p. 28.

Keokuk: Nauvoo and near Plymouth, Illinois; Keokuk and Bentonsport, Iowa.

Polypora manitobensis Whiteaves.

1892. Polypora (porosa ? var.) Manitobensis. Whiteaves, Contr. Canadian Pal., I, p. 280, pl. xxxvi, 5.

Devonian (Hamilton ?): Lake Manitoba, Manitoba.

Polypora marginata Geinitz (not McCoy). See Polypora submarginata Meek.

Polypora mexicana Prout.

1858. Polypora Mexicana. Prout, Trans. St. Louis Acad. Sci., I, p. 270, pl. xvi, 2–2*b*.
1876–7. Protoretepora (Polypora) mexicana. De Koninck, Rech. sur les Foss. Pal. de la Nouv. Galles du Sud, III, p. 179; 1898, Engl. translation, Mem. Geol. Sur. New South Wales, Pal. No. 6, p. 137.

Permian: Jornada de Muerto, New Mexico.

Polypora multiplex (Hall).

1884. Fenestella multiplex. Hall, Thirty-sixth Ann. Rep. New York State Museum, p. 57.
1887. Fenestella (Polypora) multiplex. Hall, Sixth Ann. Rep. State Geologist New York for the year 1886, p. 66.
1888. Fenestella (Polypora) multiplex. Hall, Seventh Ann. Rep. State Geologist New York for the year 1887, pl. xi, 12–16; Forty-first Ann. Rep. New York State Museum, pl. xi, 12–16.
1899. Polypora multiplex. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 162, fig. 51A.

Hamilton: Moscow, Alden, and Eighteenmile Creek, New York.

Polypora mutabilis (Hall).

1883. Fenestella mutabilis. Hall, Trans. Albany Institute, X, p. 167 (abstract, 1881, p. 25).
1883. Fenestella (Polypora) mutabilis. Hall, Rep. State Geologist New York for the year 1882, pl. xxxii, 12–15.
1887. Fenestella (Polypora) mutabilis. Hall and Simpson, Pal. New York, VI, p. 166, pl. xxxix, 12–15.

Upper Helderberg: Walpole, Ontario.

Polypora nexa (Hall).

1883. Fenestella nexa. Hall, Trans. Albany Institute, X, p. 167 (abstract, 1881, p. 25).

1883. Fenestella (Polypora) nexa. Hall, Rep. State Geologist New York for the year 1882, pl. xxxii, 4–9.

1887. Fenestella (Polypora) nexa. Hall and Simpson, Pal. New York, VI, p. 165, pl. xxxix, 4–9.

Upper Helderberg: Walpole, Ontario.

Polypora nodocarinata Ulrich.

1890. Polypora nodocarinata. Ulrich, Geol. Sur. Illinois, VIII, p. 601, pl. lxi, 9, 9a.

Upper Coal Measures: Crooked Creek, near Centralia, and Macoupin County, Illinois.

Polypora obliqua (Hall and Simpson).

1879. Fenestella Arta (in part). Hall, Thirty-second Ann. Rep. New York State Museum, p. 163 (reprint, 1880, p. 25).

1883. Fenestella arta (in part). Hall, Rep. State Geologist New York for the year 1882, pl. xviii, 8, 9.

1887. Fenestella (Polypora) obliqua. Hall and Simpson, Pal. New York, VI, p. 64, pl. xviii, 8, 9.

1888. Fenestella obliqua. Hall, Seventh Ann. Rep. State Geologist New York for the year 1887, pl. xiv, 4; Forty-first Ann. Rep. New York State Museum, pl. xiv, 4.

Lower Helderberg: Catskill, Greene County, New York.

Polypora paxillata (Hall).

1879. Fenestella paxillata. Hall, Thirty-second Ann. Rep. New York State Museum, p. 164 (reprint, 1880, p. 26).

1883. Fenestella papillata (in error). Hall, Rep. State Geologist New York for the year 1882, pl. xviii, 10–12.

1887. Fenestella (Polypora) paxillata. Hall and Simpson, Pal. New York, VI, p. 65, pl. xviii, 10–12.

Lower Helderberg: Clarksville, New York.

Polypora perangulata (Hall).

1883. Fenestella perangulata. Hall, Trans. Albany Institute, X, p. 165 (abstract, 1881, p. 23).

1883. Fenestella (Polypora) perangulata. Hall, Rep. State Geologist New York for the year 1882, pl. xxx, 13, 14.

1887. Fenestella (Polypora) perangulata. Hall and Simpson, Pal. New York, VI, p. 162, pl. xxxvii, 13, 14.

Upper Helderberg: Western New York.

Polypora perundata Hall. See Reteporidra perundata (Hall).

Polypora porosa (Hall).

1883. Fenestella porosa. Hall, Trans. Albany Institute, X, p. 167 (abstract, 1881, p. 26).

1883. Fenestella (Polypora) porosa. Hall, Rep. State Geologist New York for the year 1882, pl. xxxi, 1–6.

1887. Fenestella (Polypora) porosa. Hall and Simpson, Pal. New York, VI, p. 163, pl. xxxviii, 1–6.

Upper Helderberg: Walpole, Ontario.

Polypora propria (Hall).

1883. Fenestella propria. Hall, Trans. Albany Institute, X, p. 164 (abstract, 1881, p. 22).
1883. Fenestella (Polypora) propria. Hall, Rep. State Geologist New York for the year 1882, pl. xxvii, 10–13.
1887. Fenestella (Polypora) propria. Hall and Simpson, Pal. New York, VI, p. 157, pl. xxxiv, 10–13.
Upper Helderberg: Near Buffalo, New York.

Polypora ? psyche Billings.

1874. Polypora Psyche. Billings, Pal. Foss., II, p. 11, figs. 1, 2.
Oriskany (Gaspé Limestone): Indian Cove, Gaspé Bay, Canada.

Polypora pulchella Nicholson.

1874. Polypora pulchella. Nicholson, Geol. Mag., new ser., I, p. 161, pl. ix, 18.
1874. Polypora pulchella. Nicholson, Pal. Province Ontario, p. 99, fig. 35.
Upper Helderberg: Port Colborne, Ontario.

Polypora punctostriata (Hall).

1876. Fenestella punctostriata. Hall, Twenty-eighth Ann. Rep. New York State Museum (documentary edition), pl. xii, 15, 16; ibid. (Museum edition, 1879), p. 125, pl. xii, 15, 16.
1882. Fenestella punctostriata. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 251, pl. xi, 15, 16.
Niagara: Waldron, Indiana.

Polypora quadrangularis (Hall).

1883. Fenestella quadrangularis. Hall, Trans. Albany Institute, X, p. 163 (abstract, 1881, p. 21).
1883. Fenestella (Polypora) quadrangularis. Hall, Rep. State Geologist New York for the year 1882, pl. xxviii, 8–13, pl. xxix, 23, 24.
1886. Fenestella (Polypora) quadrangularis. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xl, 1, 2.
1887. Fenestella (Polypora) quadrangularis. Hall and Simpson, Pal. New York, VI, p. 158, pl. xxxv, 8–13, pl. xxxvi, 23, 24, pl. xl, 1, 2.
Hamilton: Falls of the Ohio.

Polypora radialis Ulrich.

1888. Polypora radialis. Ulrich, Bull. Denison Univ., IV, p. 74.
1890. Polypora radialis. Ulrich, Geol. Sur. Illinois, VIII, p. 591, pl. lx, 1–1*d*.
1894. Polypora radialis. Keyes, Missouri Geol. Sur., V, p. 29.
Waverly: Near Newark, and Richfield, Ohio.
Keokuk: Keokuk, Iowa.

Polypora retrorsa Ulrich.

1890. Polypora retrorsa. Ulrich, Geol. Sur. Illinois, VIII, p. 591, pl. lix, 6–6*d*.
1894. Polypora retrorsa. Keyes, Missouri Geol. Sur., V, p. 29.
Keokuk: Keokuk, Iowa.

Polypora rigida (Hall).

1883. Fenestella rigida. Hall, Trans. Albany Institute, X, p. 164 (abstract, 1881, p. 22).
1883. Fenestella (Polypora) rigida. Hall, Rep. State Geologist New York for the year 1882, pl. xxvii, 1–3.
1887. Fenestella (Polypora) rigida. Hall and Simpson, Pal. New York, VI, p. 155, pl. xxxiv, 1–3.
Upper Helderberg: Thompson's Lake, Albany County, New York.

Polypora rigida Prout. Not recognizable.
1866. Polypora rigida. Prout, Trans. St. Louis Acad. Sci., II, p. 412.
Geological horizon and locality not given.

Polypora robusta (Hall).
1883. Fenestella robusta. Hall, Trans. Albany Institute, X, p. 164 (abstract, 1881, p. 22).
1883. Fenestella (Polypora) robusta. Hall, Rep. State Geologist New York for the year 1882, pl. xxvii, 4–7, pl. xxx, 1, pl. xxxii, 1–3.
1887. Fenestella (Polypora) robusta. Hall and Simpson, Pal. New York, VI, p. 156, pl. xxxiv, 4–7, pl. xxvii, 1–3, pl. xliii, 1, pl. xlvi, 6.
Upper Helderberg: Walpole, Ontario.

Polypora rustica (Hall and Simpson).
1887. Fenestella (Polypora) rustica. Hall and Simpson, Pal. New York, VI, p. 169, pl. xliii, 10–13.
Upper Helderberg: Walpole, Ontario.

Polypora separata (Hall).
1883. Fenestella (Polypora) separata. Hall, Rep. State Geologist New York for the year 1882, pl. xxxii, 10, 11.
1887. Fenestella (Polypora) separata. Hall and Simpson, Pal. New York, VI, p. 166, pl. xxxix, 10, 11.
Upper Helderberg: Walpole, Ontario.

Polypora shumardi Prout.
1858. Polypora Shumardii. Prout, Trans. St. Louis Acad. Sci., I, p. 271, pl. xvi, 3–3*b*.
1876–77. Protoretepora (Polypora) Shumardii. De Koninck, Rech. sur les Foss. Pal. de la Nouv. Galles du Sud, III, p. 179; 1898, Engl. translation, Mem. Geol. Sur. New South Wales, Pal. No. 6, p. 137.
1885. Polypora shumardi. Hall, Rep. State Geologist New York for the year 1884, p. 35, pl. i, 5.
1890. Polypora shumardi. Ulrich, Geol. Sur. Illinois, VIII, p. 586, pl. lv, 2–2*d*.
1883. Fenestella cultellata. Hall, Trans. Albany Institute, X, p. 162 (abstract, 1881, p. 21).
1883. Fenestella (Polypora) cultellata. Hall, Rep. State Geologist New York for the year 1882, pl. (36) xxix, 3–22.
1886. Fenestella (Polypora) cultellata. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xli, 9.
1887. Fenestella (Polypora) cultellata. Hall and Simpson, Pal. New York, VI, p. 160, pl. xxxvi, 3–22, pl. xli, 9.
Hamilton: Falls of the Ohio.

Polypora simulatrix Ulrich.
1890. Polypora simulatrix. Ulrich, Geol. Sur. Illinois, VIII, p. 589, pl. lix, 4–4*b*.
1894. Polypora simulatrix. Keyes, Missouri Geol. Sur., V, p. 28.
Keokuk: Nauvoo, Warsaw, and Henderson County, Illinois; Keokuk and Bentonsport, Iowa.

Polypora spininodata Ulrich.
1890. Polypora spininodata. Ulrich, Geol. Sur. Illinois, VIII, p. 594, pl. lx, 3.
1894. Polypora spininodata. Keyes, Missouri Geol. Sur., V, p. 29.
Warsaw: Warsaw, Illinois.

Polypora spinulifera Ulrich.
1890. Polypora spinulifera. Ulrich, Geol. Sur. Illinois, VIII, p. 596, pl. lxi, 2, 2*a*, 3, 3*a*, 4, 4*a*.

Polypora spinulifera Ulrich—Continued.

1894. Polypora spinulifera. Keyes, Missouri Geol. Sur., V, p. 30.
Chester: Chester and Monroe County, Illinois.
Coal Measures: Montgomery County, Illinois; near Red Oak, Iowa.

Polypora stragula White.

1866. Polypora biarmica (not of Keyserling). Geinitz, Carb. und Dyas in Nebraska, p. 28.
1872. Polypora sp. undet. Meek, Pal. Eastern Nebraska, p. 155.
1874. Polypora stragula. White, Prelim. Rep. Invert. Foss., p. 19.
1877. Polypora stragula. White, Wheeler's U. S. Geol. Sur., IV, p. 108, pl. vii, 4*a*, *b*.
Carboniferous: White Mountains, Arizona (White); Nebraska (Meek).

Polypora striatopora (Hall).

1883. Fenestella striatopora. Hall, Trans. Albany Institute, X, p. 164 (abstract, 1881, p. 23).
1886. Fenestella (Polypora) striatopora. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xl, 16–19.
1887. Fenestella (Polypora) striatopora. Hall and Simpson, Pal. New York, VI, p. 168, pl. xl, 16–19.
1897. Polypora striatopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. i, 11, 14, 15.
Hamilton: Falls of the Ohio.

Polypora ? stricta (Hall and Simpson).

1883. Fenestella Eudora (?). Hall, Rep. State Geologist New York for the year 1882, pl. xix, 1, 2.
1887. Fenestella (Polypora) stricta. Hall and Simpson, Pal. New York, VI, p. 59, pl. xix, 1, 2.
Lower Helderberg: Clarksville, New York.

Polypora submarginata Meek.

1866. Polypora marginata (not of McCoy). Geinitz, Carb. und Dyas in Nebraska, p. 69, pl. v, 11*a*, *b*, 12*a*, *b*.
1872. Polypora submarginata. Meek, Pal. Eastern Nebraska, p. 154, pl. vii, 7*a*, *b*.
1890. Polypora submarginata. Ulrich, Geol. Sur. Illinois, VIII, p. 602, pl. lxi, 6–6*b*.
1894. Polypora submarginata. Keyes, Missouri Geol. Sur., V, p. 30.
Upper Coal Measures: Nebraska City, Nebraska; Macoupin County, La Salle, and Springfield, Illinois; near Red Oak, Iowa.

Polypora submutans (Hall).

1883. Fenestella submutans. Hall, Trans. Albany Institute, X, p. 163 (abstract, 1881, p. 21).
1886. Fenestella (Polypora) submutans. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xl, 3–5.
1887. Fenestella (Polypora) submutans. Hall and Simpson, Pal. New York, VI, p. 167, pl. xl, 3–5.
Hamilton: Falls of the Ohio.

Polypora tantula (Hall).

1883. Fenestella tantulus. Hall, Trans. Albany Institute, X, p. 64 (abstract, 1879, p. 8).
1882. Fenestella tantulus. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 253.
Niagara: Waldron, Indiana.

Polypora tenella Nicholson.

1874. Polypora tenella. Nicholson, Geol. Mag., new ser., I, p. 162, pl. ix, 19*b*.
1874. Polypora tenella. Nicholson, Pal. Province Ontario, p. 100, fig. 36.
Upper Helderberg: Wainfleet, Ontario.

Polypora transversa Ulrich.

1886. Polypora transversa. Ulrich, Contr. American Pal., I, p. 18, pl. ii, 2, 2*a*.
Hamilton: Falls of the Ohio.

Polypora tuberculata Prout.

1858. Polypora tuberculata. Prout, Trans. St. Louis Acad. Sci., I, p. 449, pl. xviii, 3.
1885. Polypora tuberculata. Vine, Proc. Yorkshire Geol. Polyt. Soc., IX, p. 87.
1890. Polypora tuberculata. Ulrich, Geol. Sur. Illinois, VIII, p. 595, pl. lx, 8.
1894. Polypora tuberculata. Keyes, Missouri Geol. Sur., V, p. 30.
Chester: Chester, Illinois; Litchfield, Kentucky.

Polypora tuberculata Nicholson (not Prout). See Polypora arkonensis Miller.

Polypora varia (Hall).

1888. Fenestella varia (Hall). Hall, Seventh Ann. Rep. State Geologist New York for the year 1887, pl. xiv, 10–12; Forty-first Ann. Rep. New York State Museum, pl. xiv, 10–12.
Lower Helderberg: Clarksville, New York.

Polypora varsoviensis Prout.

1858. Polypora varsoviensis. Prout, Trans. St. Louis Acad. Sci., I, p. 237, pl. xv, 3–3*b*.
1890. Polypora varsoviensis. Ulrich, Geol. Sur. Illinois, VIII, p. 593, pl. lx, 2–2*b*.
1891. Polypora Varsouviensis (?). Whitfield, Annals New York Acad. Sci., V, p. 578.
1894. Polypora varsoviensis. Keyes, Missouri Geol. Sur., V, p. 29.
Warsaw: Barretts Station, Missouri; Warsaw, and Monroe County, Illinois.
St. Louis or Chester (Maxville Limestone): Newtonville, Ohio (Whitfield).

Polypora whitei Ulrich.

1890. Polypora whitei. Ulrich, Geol. Sur. Illinois, VIII, p. 600, pl. lxii, 2.
Base of Coal Measures: Seville, Illinois.

Polypora whitei-insculpta Ulrich.

1890. Polypora whitei var. insculpta. Ulrich, Geol. Sur. Illinois, VIII, p. 600, pl. lxii, 1.
1889. Polypora whitei var. eximia (in error for insculpta). (Ulrich, in press), Miller, North American Geol. Pal., p. 317.
Upper Coal Measures: Springfield, Illinois.

Polypora whitei var. eximia Ulrich. See Polypora whitei-insculpta Ulrich.

Polyporella Simpson. See Polypora McCoy.

Polyporella fistulata Simpson. See Polypora fistulata (Hall).

PRASOPORA Nicholson and Etheridge, Jun. Genotype: Prasopora grayæ Nicholson and Etheridge, Jun.

1877. Prasopora. Nicholson and Etheridge, Jun., Ann. Mag. Nat. Hist., ser. 4, XX, p. 38.

PRASOPORA Nicholson and Etheridge, Jun.—Continued.

1879. Prasopora. Nicholson, Pal. Tabulate Corals, p. 324.
1881. Prasopora. Nicholson, Genus Monticulipora, pp. 102, 202.
1882. Prasopora.' Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 153.
1883. Prasopora. Foord, Contr. Micro-Pal. Cambro-Sil., p. 10.
1887. Prasopora. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 170.
1889. Prasopora. Miller, North American Geol. Pal., p. 201.
1890. Prasopora. Ulrich, Geol. Sur. Illinois, VIII, p. 371.
1893. Prasopora. Ulrich, Geol. Minnesota, III, p. 244.
1896. Prasopora (in part). Zittel's Textb. Pal. (Engl. ed.), p. 104.
1896. Prasopora. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 273.
1897. Prasopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 586.

Prasopora affinis Foord.

1883. Prasopora affinis. Foord, Contr. Micro-Pal. Cambro-Sil., p. 12, pl. iii, 2–2*c*.
1890. Prasopora affinis. Ulrich, Geol. Sur. Illinois, VIII, fig. 7*c* (p. 318).
Trenton: Ottawa City, Canada; Cannon Falls and Berne, Minnesota.

Prasopora calycula Ulrich. See Aspidopora calycula (James).

Prasopora conoidea Ulrich.

1886. Prasopora conoidea. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Sur. Minnesota, p. 87.
1893. Prasopora conoidea. Ulrich, Geol. Minnesota, III, p. 249, pl. xvi, 11–15.
1897. Prasopora conica (in error for conoidea). Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 170 (p. 587).
Trenton (Black River): Cannon Falls and St. Paul, Minnesota.

Prasopora contigua Ulrich.

1886. Prasopora contigua. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Sur. Minnesota, p. 87.
1893. Prasopora contigua. Ulrich, Geol. Minnesota, III, p. 249, pl. xvi, 24–26.
1894. Prasopora contigua. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 180.
Trenton (Black River and Trenton): Goodhue and Dakota counties, Minnesota; Covington, Kentucky; Mount Pleasant, Tennessee.

Prasopora grandis (Ulrich).

1886. Monticulipora grandis. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Sur. Minnesota, p. 78.
1893. Monticulipora grandis. Ulrich, Geol. Minnesota, III, p. 219, pl. xv, 1–6.
Trenton (Stones River and Trenton): Minneapolis, St. Paul, and Cannon Falls, Minnesota.

Prasopora ? hospitalis (Nicholson).

1881. Monticulipora (Prasopora) Selwynii var. hospitalis. Nicholson, Genus Monticulipora, p. 209, fig. 45.
1882. Prasopora hospitalis. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 237.
1888. Monticulipora hospitalis. James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 26.
1888. Monticulipora hospitalis var. neglecta. James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 27, pl. i, 3.
1896. Monticulipora hospitalis var. neglecta. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 124.
Cincinnati (Richmond): A common form of the Richmond in Ohio, Indiana, and Illinois.

Prasopora insularis Ulrich.

1893. Prasopora insularis. Ulrich, Geol. Minnesota, III, p. 251, pl. xvi, 18–23.
Trenton: Cannon Falls, St. Paul, Berne, and Kenyon, Minnesota; Neenah, Wisconsin; Decorah, Iowa.

Prasopora insularis-filmorensis Ulrich.

1893. Prasopora insularis var. filmorensis. Ulrich, Geol. Minnesota, III, p. 252, pl. xvi, 18, 19.
Trenton: Fountain and Preston, Minnesota.

Prasopora lenticularis Ulrich.

1893. Prasopora lenticularis. Ulrich, Geol. Minnesota, III, p. 253, pl. xvii, 22–25.
Trenton (Black River): St. Paul and Cannon Falls, Minnesota.

Prasopora lycoperdon Ulrich. See Prasopora simulatrix Ulrich.

Prasopora lycoperdon Vanuxem, var. Selwyni Ami. Not recognizable.

1892. Prasopora lycoperdon Vanuxem, var. Selwyni. Ami, Canadian Record of Science, V, p. 99.
Trenton: Quebec City, Quebec.

Prasopora ? newberryi Ulrich. See Aspidopora newberryi (Nicholson).

Prasopora nodosa Ulrich.

1882. Prasopora nodosa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 245, pl. xi, 1–1*b*.
1894. Prasopora nodosa. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 189.
Trenton: Nashville, Tennessee; Burgin and Frankfort, Kentucky.

Prasopora oculata Foord.

1883. Prasopora oculata. Foord, Contr. Micro-Pal. Cambro-Sil., p. 11, pl. iii, 1–1*g*.
1893. Prasopora oculata. Ulrich, Geol. Minnesota, III, p. 252, fig. 15*c*, *d*.
Trenton: Ottawa City, Canada; Goodhue County, Minnesota.

Prasopora parmula Foerste. See Aspidopora parmula (Foerste).

Prasopora selwyni (Nicholson).

1879. Monticulipora (Diplotrypa) Whiteavesii (in part). Nicholson, Pal. Tabulate Corals, p. 316.
1881. Monticulipora (Prasopora) Selwynii. Nicholson, Genus Monticulipora, p. 206, fig. 44.
1893. Prasopora selwyni. Ulrich, Geol. Minnesota, III, p. 250, pl. xvi, 16, 17, fig. 15*a*, *b* (p. 248).
1896. Prasopora Selwynii. Zittel's Textb. Pal. (Engl. ed.), fig. 188A (not B= Peronopora decipiens (Rominger)) (p. 104).
Trenton: Peterborough and Ottawa, Ontario; Cannon Falls, Minnesota.

Prasopora simulatrix Ulrich.

1886. Prasopora simulatrix. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Sur. Minnesota, p. 85.
1893. Prasopora simulatrix. Ulrich, Geol. Minnesota, III, p. 245, pl. xvi, 1-10.
1896. Prasopora simulatrix. Ulrich, Zittel's Textb. Pal. (Engl. ed.), fig. 452 (p. 273).
1897. Prasopora simulatrix. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 171, 172 (p. 587).
1890. Prasopora lycoperdon. Ulrich, Geol. Sur. Illinois, VIII, fig. 7*a*–*b* (p. 318).
1895. Monticulipora selwynii (not of Nicholson). J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 86.

Prasopora simulatrix Ulrich—Continued.

1895. Trenton (Black River and Trenton): A rather common form in the Trenton of Kentucky, Tennessee, and Wisconsin, and in the Black River and Trenton of Minnesota.

Prasopora simulatrix-orientalis Ulrich.

1879. Monticulipora (Diplotrypa) Whiteavesii (in part). Nicholson, Pal. Tabulate Corals, p. 316, fig. 42*c*, pl. xiv, 1.

1893. Prasopora simulatrix var. orientalis. Ulrich, Geol. Minnesota, III, p. 246, pl. xvi, 1, 2, 6, 7.

Trenton: Ottawa and Peterborough, Canada; Trenton Falls, New York.

PRISMOPORA Hall. Genotype: Prismopora triquetra Hall.

1883. Prismopora. Hall, Trans. Albany Institute, X, pp. 158, 193 (abstract, 1881, p. 17).

1884. Prismopora. Hall, Rep. State Geologist New York for the year 1883, p. 50.

1884. Prismopora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, p. 40.

1887. Prismopora. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 75.

1887. Prismopora. Hall and Simpson, Pal. New York, VI, p. xxi.

1889. Prismopora. Miller, North American Geol. Pal., p. 317.

1890. Prismopora. Ulrich, Geol. Sur. Illinois, VIII, p. 386.

1897. Prismopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 531.

Prismopora dilata Hall. See Prismopora dilatata Hall.

Prismopora dilatata Hall.

1883. Prismopora dilata. Hall, Trans. Albany Institute, X, p. 193 (abstract, 1881, p. 193).

1884. Prismopora dilatata. Hall, Rep. State Geologist New York for the year 1883, p. 50.

1887. Prismopora dilatata. Hall and Simpson, Pal. New York, VI, p. 265, pl. lxii, 13, 14.

1891. Prismopora dilatata. Hall, Tenth Ann. Rep. State Geologist New York for the year 1890, p. 53; Forty-fourth Ann. Rep. New York State Museum. p. 83.

Hamilton: Near Leonardsville, New York.

Prismopora lata Hall and Simpson.

1887. Prismopora lata. Hall and Simpson, Pal. New York, VI, p. 266.

1891. Prismopora lata. Hall, Tenth Ann. Rep. State Geologist New York for the year 1890, p. 53; Forty-fourth Ann. Rep. New York State Museum, p. 83.

Hamilton: Near Le Roy, New York.

Prismopora minima Ulrich.

1890. Prismopora minima. Ulrich, Geol. Sur. Illinois, VIII, p. 506, pl. lxxviii, 1–1c.

Lower Coal Measures: Sparta, Illinois.

Prismopora paucirama Hall.

1883. Prismopora paucirama. Hall, Trans. Albany Institute, X, p. 159 (abstract, 1881, p. 17).

1883. Prismopora paucirama. Hall, Rep. State Geologist New York for the year 1882, pl. xxv, 11.

1886. Prismopora paucirama. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxix, 16, 17.

1887. Prismopora paucirama. Hall and Simpson, Pal. New York, VI, p. 98, pl. xxviii, 11, pl. xxix, 16, 17.

Upper Helderberg: Thompsons Lake, Albany County, New York.

Prismopora ? serrata (Meek).

1875. Ptilodictya (Stictopora) serrata. Meek, Pal. Ohio, II, p. 327, pl. xx, 4.

1887. Prismopora serrata. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 75, pl. vii, *6a–c*.

Lower Coal Measures: Flint Ridge, Ohio.

Obs. This may prove the same as Cystodictya carbonaria (Meek).

Prismopora serrulata Ulrich.

1884. Prismopora serrulata. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, p. 41, pl. ii, 2–2*f*.

Chester: Sloans Valley and Grayson Springs, Kentucky.

Prismopora sparsipora (Hall).

1883. Thallostigma sparsipora. Hall, Trans. Albany Institute, X, p. 155 (abstract, 1881, p. 13).

1886. Prismopora sparsipora. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxxii, 25–28.

1887. Prismopora sparsipora. Hall and Simpson, Pal. New York, VI, p. 288, pl. xxxii, 24–27.

Hamilton: Falls of the Ohio. In the Trans. Albany Institute, X, p. 155, the locality is given as Onondaga Valley, New York.

Prismopora subtriquetra Simpson. See **Prismopora triquetra** Hall.

Prismopora triangulata (White).

1878. Ptilodictya triangulata. White, Proc. Acad. Nat. Sci. Philadelphia, p. 35.

1879. Ptilodictya triangulata. White, Bull. U. S. Geol. Sur. Territories, V, p. 214.

1881. Ptilodictya triangulata. White, Wheeler's U. S. Geol. Sur., III, Appendix, p. xxiv, pl. iv, *2a–e*.

1881. Ptilodictya triangulata. White, Twelfth Ann. Rep. U. S. Geol. Geogr. Sur. Territories, p. 131, pl. xxxiii, *3a–e*.

1884. Prismopora triangulata. Ulrich, Jour. Cincinnati Soc. Nat. Hist, VII, p. 41.

Coal Measures: Danville, Illinois.

Prismopora trifolia Ulrich. See **Phractopora trifolia** (Rominger).

Prismopora triquetra Hall.

1883. Prismopora triquetra. Hall, Trans. Albany Institute, X, p. 159 (abstract, 1881, p. 17).

1883. Prismopora triquetra. Hall, Rep. State Geologist New York for the year 1882, pl. xxv, 8–10.

1886. Prismopora triquetra. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxix, 9–15.

1887. Prismopora triquetra. Hall and Simpson, Pal. New York, VI, p. 97, pl. xxviii, 8–10, pl. xxix, 9–15.

1897. Prismopora triquetra. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xii, 9–14.

1897. Prismopora subtriquetra. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xii, 15.

Hamilton: Falls of the Ohio.

PROBOSCINA Audouin. Genotype: Proboscina boryi Audouin.

1826. Proboscina. Audouin, Savigny's Descr. del Egypte, Pol., p. 236.

1854. Proboscina. D'Orbigny, Pal. Francais, Terr. Cret., V, p. 844.

1854. Proboscina. Haime, Bry. Foss. Form. Juras., p. 166 (extra edition, p. 10).

1882. Proboscina. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 149.

1890. Proboscina. Ulrich, Geol. Sur. Illinois, VIII, p. 368.

1893. Proboscina. Ulrich, Geol. Minnesota, III, p. 119.

PROBOSCINA Audouin—Continued.

1897. Proboscina. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 596.

Proboscina auloporoides (Nicholson).

1875. Alecto auloporoides. Nicholson, Pal. Ohio, II, p. 267, pl. xxv, 2–2*b*.
1889. Proboscina auloporoides. Ulrich, Contr. Micro-Pal. Cambro-Sil., Part II, p. 28.
1889. Stomatopora auloporoides. Miller, North American Geol. Pal., p. 325.
1895. Proboscina auloporoides. Whiteaves, Pal. Foss., III, p. 115.
Cincinnati (Lorraine and Richmond): Cincinnati, Ohio, and vicinity; Stony Mountain, Manitoba.

Proboscina confusa (Nicholson).

1875. Alecto confusa. Nicholson, Pal. Ohio, II, p. 267, pl. xxv, 6.
1889. Stomatopora confusa. Miller, North American Geol. Pal., p. 325.
Cincinnati (Utica): Cincinnati, Ohio, and vicinity.

Proboscina frondosa (Nicholson).

1873. Aulopora frondosa. James, Additions to Catal. Sil. Foss. Cincinnati group, p. 15. (Not defined.)
1875. Alecto frondosa. Nicholson, Pal. Ohio, II, p. 266, pl. xxv, 3–3*b*.
1889. Stomatopora frondosa. Miller, North American Geol. Pal., p. 325.
1889. Proboscina frondosa. Ulrich, Contr. Micro-Pal. Cambro-Sil., Part II, p. 28.
1893. Proboscina frondosa. Ulrich, Geol. Minnesota, III, p. 119, pl. i, 28.
1895. Proboscina frondosa. Whiteaves, Pal. Foss., III, p. 115.
1896. Stomatopora (Proboscina) frondosa. Ulrich, Zittel's Textb. Pal. (Eng. ed.), fig. 412*c* (p. 261).
1897. Proboscina frondosa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 201 (in part) (p. 596).
Cincinnati (Lorraine and Richmond): Cincinnati, Ohio, and vicinity (Lorraine); in the Richmond beds of Ohio, Indiana, Kentucky, Illinois, and at Stony Mountain, Manitoba.

Proboscina ? laxa Whiteaves.

1891. Proboscina laxa. Whiteaves, Contr. Canadian Pal., I, p. 212, pl. xxviii, 9, 9*a*.
Devonian (Hamilton?): Hay River, Canada.

Proboscina tumulosa Ulrich.

1893. Proboscina tumulosa. Ulrich, Geol. Minnesota, III, p. 119, pl. i, 24.
1897. Proboscina tumulosa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 201 (in part) (p. 596).
Trenton (Black River): St. Paul and Cannon Falls, Minnesota.

PROTOCRISINA Ulrich. Genotype: Protocrisina exigua Ulrich.

1890. Protocrisina. Ulrich, Geol. Sur. Illinois, VIII, p. 369.
1889. Protocrisina. (Ulrich, in press), Miller, North American Geol. Pal., p. 317.
1896. Protocrisina. Ulrich, Zittel's Textb. Pal. (Eng. ed.), p. 262.

Protocrisina exigua Ulrich.

1890. Protocrisina exigua. Ulrich, Geol. Sur. Illinois, VIII, p. 405, pl. xxix, 4–4*c*, pl. liii, 11–11*e*.
1896. Protocrisina exigua. Ulrich, Zittel's Textb. Pal. (Eng. ed.), fig. 417 (p. 262).
Trenton: Montreal, Canada; Trenton Falls, New York.
Cincinnati (Richmond): Wilmington, Illinois.

Protoretepora De Koninck. See Polypora McCoy.

Protoretepora (Polypora) Halliana De Koninck. See **Polypora halliana** Prout.

Protoretepora (Polypora) mexicana De Koninck. See **Polypora mexicana** Prout.

Protoretepora (Polypora) Shumardii De Koninck. See **Polypora** shumardi Prout.

Protoretepora (Polypora) hamiltoniana De Koninck. See **Reteporina** hamiltonensis (Prout).

PROUTELLA Ulrich. Genotype: Cyclopora discoidea Prout.

1890. Proutella. Ulrich, Geol. Sur. Illinois, VIII, pp. 403, 674.
1889. Proutella. (Ulrich, in press), Miller, North American Geol. Pal., p. 318.
1897. Proutella. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 601.

Proutella discoidea (Prout).

1860. Cyclopora discoidea. Prout, Trans. St. Louis Acad. Sci., I, p. 578.
1866. Cyclopora discoidea. Prout, Geol. Sur. Illinois, II, p. 420, pl. xxi, 2, 2*a*, pl. xxii, 10, 10*a*.
1890. Proutella discoidea. Ulrich, Geol. Sur. Illinois, VIII, p. 674, pl. lxix, 4–4*d*.
1894. Proutella discoidea. Keyes, Missouri Geol. Sur., V, p. 37.
1897. Proutella discoidea. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 214–216 (p. 602).
Keokuk: Warsaw, Hamilton, and Nauvoo, Illinois; Keokuk, Iowa.

Pteropora Hall. See Tæniopora Nicholson.

Pteropora duogeneris Hall. See Tæniopora exigua Nicholson.

Ptilionella Hall. See Reptaria Rolle.

Ptilionella conferta Hall. See Hederella conferta (Hall).

Ptilionella nodata Hall. See Reptaria nodata (Hall).

Ptilionella penniformis Hall. See Reptaria stolonifera Rolle.

PTILOCELLA Simpson. Genotype: Ptilodictya parallela Hall.

1897. Ptilocella. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 605.

Ptilocella parallela (Hall and Simpson).

1887. Ptilodictya parallela. Hall and Simpson, Pal. New York, VI, p. 270, pl. lxi, 7, 8.
1891. Ptilodictya parallela. Hall, Tenth Ann. Rep. State Geologist New York for the year 1890, p. 54; Forty-fourth Ann. Rep. New York State Museum, p. 84.
1897. Ptilocella parallela. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xv, 1–3.
Hamilton: Darien Center and near the head of Lake Canandaigua, New York.

PTILODICTYA Lonsdale. Genotype: Flustra lanceolata Lonsdale (Goldfuss ?).

1839. Ptilodictya. Lonsdale, Murchison's Silurian System, p. 676.
1852. Ptilodictya. McCoy, Brit. Pal. Foss., p. 45.
1860. Ptilodictya. Eichwald, Lethæa Rossica, I, p. 387.
1874. Ptilodictya. Nicholson, Geol. Mag., new ser., I, p. 123.
1874. Ptilodictya. Nicholson, Pal. Province Ontario, p. 97.
1881. Ptilodictya. Vine, Rep. Brit. Assoc. Adv. Sci., p. 164.

PTILODICTYA Lonsdale—Continued.

1882. Ptilodictya. Vine, Quar. Jour. Geol. Soc. London, XXXVIII, p. 63.
1882. Ptilodictya. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, pp. 151, 162.
1883. Ptilodictya. Vine, Rep. British Assoc. Adv. Sci., p. 203.
1887. Ptilodictya. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 155.
1887. Ptilodictya. Hall and Simpson, Pal. New York, VI, p. xix.
1889. Ptilodictya. Miller, North American Geol. Pal., p. 316.
1889. Ptilodictya. Nettleroth, Kentucky Fossil Shells, p. 30.
1890. Ptilodictya. Ulrich, Geol. Sur. Illinois, VIII, p. 390.
1893. Ptilodictya. Ulrich, Geol. Minnesota, III, p. 163.
1896. Ptilodictya. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 279.
1897. Ptilodictya. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 541.
1899. Ptilodictya. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 176.
1874. Escharopora (not of Hall, 1847, Pal. New York, I, p. 72). Hall, Twenty-sixth Ann. Rep. New York State Mus., [p. 99]; Thirty-second Ann. Rep. New York State Museum, 1879, p. 161.
1875. Heterodictya. Nicholson, Geol. Mag., new ser., II, p. 33.
1875. Heterodictya. Nicholson, Pal. Province Ontario, p. 79.
1889. Heterodictya. Miller, North American Geol. Pal., p. 309.

Ptilodictya acuminata James. See Escharopora acuminata (James).

Ptilodictya acuta Nicholson. See Pachydictya acuta (Hall).

Ptilodictya alcyone Billings. See Pachydictya alcyone (Billings).

Ptilodictya angusta (Hall).

1883. Escharopora (Ptilodictya) angusta. Hall, Trans. Albany Institute, X, p. 62 (abstract, 1879, p. 6).
1882. Escharopora (Ptilodictya) angusta. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. His., p. 245.
Niagara: Waldron, Indiana.

Ptilodictya antiqua James. See Eurydictya multipora (Hall).

Ptilodictya ? arctipora Nicholson. See Bythopora arctipora (Nicholson.)

Ptilodictya arguta Billings. See Pachydictya crassa (Hall).

Ptilodictya bipunctata (Van Cleve) Hall. See Phænopora expansa Hall and Whitfield.

Ptilodictya briareus Ulrich. See Escharopora briareus (Ulrich).

Ptilodictya canadensis Billings.

1866. Ptilodictya canadensis. Billings, Catal. Sil. Foss. Anticosti, p. 9.
Cincinnati (Richmond): Anticosti Island.

Ptilodictya (Stictopora) carbonaria Meek. See Cystodictya carbonaria (Meek).

Ptilodictya ? cincinnatiensis James. See Arthropora shafferi-cleavelandi (James).

Ptilodictya cleavelandi James. See Arthropora shafferi-cleavelandi (James).

Ptilodictya clintonensis James. See Ptilodictya nodosa James.

Ptilodictya cosciniformis Nicholson. See Coscinella cosciniformis (Nicholson).

Ptilodictya crassa Nicholson and Hinde. See **Pachydictya crassa** (Hall).

Ptilodictya cruciformis d'Orbigny (not defined). See **Escharopora falciformis** (Nicholson).

Ptilodictya (Stictopora?) dictyota Meek. See **Coscinium dictyotum** (Meek).

Ptilodictya dubia James. See **Arthropora shafferi-cleavelandi** (James).

Ptilodictya emacerata Nicholson. See **Dicranopora emacerata** (Nicholson).

Ptilodictya ensiformis Ulrich. See **Phænopora ? ensiformis** Hall.

Ptilodictya excellens Billings. See **Phænopora excellens** (Billings).

Ptilodictya expansa Hall (in part). See **Phænopora expansa** Hall and Whitfield.

Ptilodictya expansa Hall.

1883. Ptilodictya expansa (in part). Hall, Twelfth Ann. Rep. Indiana Geol. Nat. Hist., pl. xii, 2, 3 (but not description on p. 266=Phænopora expansa Hall and Whitfield).
1887. Ptilodictya expansa. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 155; ibid., III, 1888, pl. xv, 5.
1889. Ptilodictya expansa. Foerste, Proc. Boston Soc. Nat. Hist., XXIV, p. 327.
1890. Ptilodictya expansa. Ulrich, Geol. Sur. Illinois, VIII, fig. 11*e* (p. 391).
1895. Ptilodictya lanceolata var. Americana. Foerste, Geol. Sur. Ohio, VII, p. 598, pl. xxxvi, 3*a*–*b*.

Clinton: Dayton and Todds Fork, Ohio; Cumberland Gap, Tennessee. (Foerste).

Ptilodictya expansa-emarcescens Foerste.

1889. Ptilodictya expansa var. emarcescens. Foerste, Proc. Boston Soc. Nat. Hist., XXIV, p. 328, pl. vi, 30.
1895. Pachydictya emarcescens. Foerste, Geol. Sur. Ohio, VII, p. 599, pl. xxxi, 30.

Clinton: Eaton, Ohio.

Obs. This form may prove to be young examples of Ptilodictya expansa Hall.

Ptilodictya explicans Safford. Not recognized.

1869. Ptilodictya explicans. Safford, Geol. Tennessee, p. 286.

Ptilodictya falciformis Nicholson. See **Escharopora falciformis** (Nicholson).

Ptilodictya famelicus Foerste. See **Pachydictya ? famelica** (Foerste).

Ptilodictya farctus Foerste. See **Pachydictya crassa** (Hall).

Ptilodictya fenestelliformis Nicholson. See **Pachydictya fenestelliformis** (Nicholson).

Ptilodictya fimbriata James. See **Phænopora fimbriata** (James).

Ptilodictya flagellum Nicholson.

1875. Ptilodictya flagellum. Nicholson, Ann. Mag. Nat. Hist., ser. 4, XV, p. 179, pl. xiv, 3–3*b*.
1875. Ptilodictya flagellum. Nicholson, Pal. Ohio, II, p. 262, pl. xxv, 4–4*b*.

Cincinnati (Richmond): Near Lebanon, Ohio.

Obs. Ptilodictya nodosa James may be a synonym of this species.

Ptilodictya flexuosa James. See **Stictoporella flexuosa** (James).

Ptilodictya fragilis Billings. See Dicranopora fragilis (Billings).

Ptilodictya gigantea (Nicholson).

1875. Heterodictya gigantea. Nicholson, Geol. Mag., new ser., II, p. 34, pl. ii, 1*a–e*.
1875. Heterodictya gigantea. Nicholson, Pal. Province Ontario, p. 79, pl. ii, 1*a–e*.
1882. Ptilodictya (Heterodictya) gigantea. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 140.
1889. Heterodictya gigantea. Miller, North American Geol. Pal., fig. 488 (p. 309).
Upper Helderberg: Jarvis, Ontario.

Ptilodictya Gilberti Nicholson. See Cystodictya gilberti (Meek).

Ptilodictya (Stictopora) Gilberti Meek. See Cystodictya gilberti (Meek).

Ptilodictya gladiola Billings.

1866. Ptilodictya gladiola. Billings, Catal. Sil. Foss. Anticosti, p. 10.
Anticosti: Anticosti Island.

Ptilodictya grahami James. See Arthropora shafferi-cleavelandi (James).

Ptilodictya granulosa James. See Rhinidictya parallela (James).

Ptilodictya hilli James. See Escharopora hilli (James).

Ptilodictya internodia Miller and Dyer. See Dicranopora internodia (Miller and Dyer).

Ptilodictya kentuckyensis James.

1881. Ptilodictya kentuckyensis. James, Paleontologist, No. 5, p. 38.
Cincinnati: Cincinnati, Ohio.
Obs. Description given is not sufficient to identify the species. The form may perhaps be a synonym of Arthropora shafferi-cleavelandi (James).

Ptilodictya lanceolata var. Americana Foerste. See Ptilodictya expansa Hall.

Ptilodictya libana Safford. See Escharopora libana (Safford).

Ptilodictya (Stictopora) lichenoides Meek. Not recognizable.

1873. Ptilodictya (Stictopora) lichenoides. Meek, Pal. Ohio, I, p. 195, pl. xviii, 2.
Corniferous: Whitehouse, Lucas County, Ohio.

Ptilodictya lirata Hall and Simpson. See Phænopora lirata (Hall).

Ptilodictya maculata Ulrich. See Escharopora maculata (Ulrich).

Ptilodictya magnifica Miller.

1878. Ptilodictya magnifica. Miller, Jour. Cincinnati Soc. Nat. Hist., I, p. 100, pl. iii, 1, 1*a*.
1889. Ptilodictya magnifica. Miller, North American Geol. Pal., fig. 503, (p. 318).
1890. Ptilodictya magnifica. Ulrich, Geol. Sur. Illinois, VIII, fig. 11*a–c* (p. 391).
Cincinnati (Richmond): Richmond, Indiana; Oxford and Waynesville, Ohio; Wilmington, Illinois; Leipers Creek, Maury County, Tennessee.

Ptilodictya Meeki Nicholson. See Cystodictya meeki (Nicholson).

Ptilodictya multiramis Safford. Not recognized.

1869. Ptilodictya multiramis. Safford, Geol. Tennessee, p. 286.
Obs. See note on Escharopora briareus Ulrich.

Ptilodictya nebulosa (Hall).

1874. Escharopora nebulosa. Hall, Twenty-sixth Ann. Rep. New York State Museum, p. 99.

1879. Escharopora nebulosa. Hall, Thirty-second Ann. Rep. New York State Museum, p. 162 (reprint, 1880, p. 24).

1883. Escharopora (Ptilodictya) nebulosa. Hall, Rep. State Geologist New York for the year 1882, pl. xvii, 14–16.

1887. Ptilodictya nebulosa. Hall and Simpson, Pal. New York, VI, p. 40, pl. xvii, 13–18.

1874. Paleschara bifoliata. Hall, Twenty-sixth Ann. Rep. New York State Museum, p. 107.

1879. Escharopora (? Paleschara) bifoliata. Hall, Thirty-second Ann. Rep. New York State Museum, p. 162 (reprint, 1880, p. 24).

1883. Paleschara ? foliata. Hall, Rep. State Geologist New York for the year 1882, pl. xvii, 17, 18.

Lower Helderberg: Catskill, Clarksville, and Schoharie, New York.

Ptilodictya nitidula Billings. See Dicranopora nitidula (Billings).

Ptilodictya nodosa James.

1879. Ptilodictya nodosa. James, Paleontologist, No. 3, p. 20.

1882. Ptilodictya nodosa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., IV, pl. vii, 2, 2*a*.

1881. Ptilodictya clintonensis. James, Paleontologist, No. 5, p. 38.

1881. Ptilodictya teres. James, Paleontologist, No. 5, p. 40.

1890. Ptilodictya variabilis. Ulrich, Geol. Sur. Illinois, VIII, p. 304, fig. 2*a*, and fig. 6*a* (p. 317).

1889. Ptilodictya variabilis. Miller, North American Geol. Pal., figs. 505, 506 (p. 319).

Cincinnati (Richmond): Clinton and Warren counties, Ohio.

Obs. See also Ptilodictya flagellum Nicholson.

Ptilodictya obliqua (Ringueberg).

1884. Stictopora obliqua. Ringueberg, Proc. Acad. Nat. Sci. Philadelphia, p. 146, pl. ii, 2, 2*a*.

1889. Ptilodictya obliqua. Miller, North American Geol. Pal., p. 319.

Clinton: Lockport, New York.

Obs. This species was defined and figured in such a manner that it is questionable whether it can be recognized.

Ptilodictya parallela Hall and Simpson. See Ptilocella parallela (Hall and Simpson).

Ptilodictya parallela James. See Rhinidictya parallela (James).

Ptilodictya pavonia D'Orbigny. See Escharopora pavonia (D'Orbigny).

Ptilodictya perelegans Ulrich. See Graptodictya perelegans (Ulrich).

Ptilodictya platyphylla James. See Phænopora expansa Hall and Whitfield.

Ptilodictya plumaria James.

1878. Ptilodictya plumaria. James, Paleontologist, No. 1, p. 4.

1882. Ptilodictya plumaria. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, pl. vii, 1, 1*a*.

Cincinnati (Richmond): Waynesville and Oxford, Ohio.

Ptilodictya plumea Hall and Simpson. See Stictoporina plumea (Hall and Simpson).

Ptilodictya ponderosa Ulrich.

1888. Ptilodictya ponderosa. Ulrich, American Geologist, I, p. 308.
Trenton: Covington, Kentucky.
Obs. This is a good species belonging to the genus Escharopora, but requires further description before the name can be considered valid.

Ptilodictya ? punctata Nicholson and Hinde. See Phænopora punctata (Nicholson and Hinde).

Ptilodictya ramosa Ulrich. See Escharopora ramosa (Ulrich).

Ptilodictya ? raripora Nicholson and Hinde. See Nematopora raripora (Hall).

Ptilodictya retiformis Hall and Simpson. See Stictoporina plumea (Hall and Simpson).

Ptilodictya rudis Foerste. See Pachydictya crassa (Hall).

Ptilodictya rustica Billings. See Pachydictya crassa (Hall).

Ptilodictya scutulata Hall and Simpson. See Stictoporina scutulata (Hall).

Ptilodictya (Stictopora) sereata Meek. See Prismopora? serrata (Meek).

Ptilodictya Shafferi Nicholson. See Arthropora shafferi (Meek).

Ptilodictya (Stictopora) Shafferi Meek. See Arthropora shafferi (Meek).

Ptilodictya subrecta Ulrich. See Escharopora subrecta (Ulrich).

Ptilodictya sulcata Billings.

1866. Ptilodictya sulcata. Billings, Catal. Sil. Fos. Anticosti, p. 35.
Anticosti: Anticosti Island.

Ptilodictya superba Billings. See Phænopora superba (Billings).

Ptilodictya symmetra Safford. Not recognized.

1869. Ptilodictya symmetra. Safford, Geol. Tennessee, p. 286.

Ptilodictya ?? tarda Billings.

1874. Ptilodictya tarda. Billings, Pal. Foss., II, p. 13.
Oriskany (Gaspé Limestone): Grand Creve, Canada.

Ptilodictya ? tenera Billings.

1866. Ptilodictya tenera. Billings, Catal. Sil. Foss. Anticosti, p. 33.
Anticosti: Anticosti Island.

Ptilodictya tenuis Hall and Simpson. See Phænopora tenuis (Hall).

Ptilodictya teres James. See Ptilodictya nodosa James.

Ptilodictya triangulata White. See Prismopora triangulata (White).

Ptilodictya variabilis Ulrich. See Ptilodictya nodosa James.

Ptilodictya (Stictopora) variabilis Prout. Not recognized; probably Cystodictya gilberti (Meek).

1866. Ptilodictya (Stictopora) variabilis. Prout, Trans. St. Louis Acad. Sci., II, p. 412.
Devonian: Columbus, Ohio.

Ptilodictya welshi James. See Phænopora multifida (Hall).

Ptilodictya whiteavesi Ulrich.

1889. Ptilodictya Whiteavesii. Ulrich, Contr. Micro-Pal. Cambro-Sil., Part II, p. 44, pl. viii, 1-1*e*.
1895. Ptilodictya Whiteavesii. Whiteaves, Pal. Foss., III, p. 118.
Cincinnati (Richmond): Stony Mountain, Manitoba.

Ptilodictya whitfieldi Foerste.

1895. Ptilodictya Whitfieldi. Foerste, Geol. Sur. Ohio, VII, p. 598, pl. xxxvi, 4, pl. xxviii, 5.
Clinton: Todds Fork, Ohio.

PTILOPORA McCoy. Genotype: Ptilopora pluma McCoy.

1845. Ptilopora. McCoy, Synop. Carbon. Foss. Ireland, p. 200.
1858. Ptilopora. Hall, Pal. Iowa, p. 652.
1860. Ptilopora. Eichwald, Lethæa Rossica, I, p. 381.
1883. Ptilopora. Hall, Trans. Albany Institute, X, p. 196 (abstract, 1881, p. 196).
1883. Ptilopora. Claypole, Quar. Jour. Geol. Soc. London, XXXIX, p. 31.
1885. Ptilopora. Hall, Rep. State Geologist, New York, for the year 1884, p. 36.
1885. Ptilopora. Waagen and Pichl, Pal. Indica, Ser. XIII, p. 774.
1886. Ptilopora. Ulrich, Contr. American Pal., I, p. 4.
1887. Ptilopora. Hall and Simpson, Pal. New York, VI, p. xxiv.
1889. Ptilopora. Miller, North American Geol. Pal., p. 318.
1890. Ptilopora. Ulrich, Geol. Sur. Illinois, VIII, pp. 398, 621.
1895. Ptilopora. Whidborne, Devon. Fauna England, (Pal. Soc. Publ.), II, part 4, p. 184.
1896. Ptilopora. Ulrich, Zittel's Textb. Pal. (Engl. ed.) p. 283.
1897. Ptilopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pp. 519, 521.
1876-77. Dendricopora. De Koninck, Rech. sur les Foss. Pal. de la Nouv. Galles du Sud, III, p. 169; 1898, Engl. translation, Mem. Geol. Sur. New South Wales, Pal. No. 6, p. 129.
1885. Dendricopora. Waagen and Pichl, Pal. Indica, Ser. XIII, p. 774.

Ptilopora acuta Ulrich.

1890. Ptilopora acuta. Ulrich, Geol. Sur. Illinois, VIII, p. 622, pl. lxv, 4, 4*a*.
1894. Ptilopora acuta. Keyes, Missouri Geol. Sur., V, p. 31.
Keokuk: Keokuk and Bentonsport, Iowa.
Burlington: Burlington, Iowa.

Ptilopora cylindracea Ulrich.

1890. Ptilopora cylindracea. Ulrich, Geol. Sur. Illinois, VIII, p. 623, pl. lxvi, 2-2*b*.
1894. Ptilopora cylindracea. Keyes, Missouri Geol. Sur., V, p. 32.
Keokuk: Kings Mountain, Kentucky; Bentonsport, Iowa.

Ptilopora infrequens Hall and Simpson.

1887. Ptilopora infrequens. Hall and Simpson, Pal. New York, VI, p. 284, pl. lxvi, 26-29.
1897. Ptilopora infrequens. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. viii, 4, 6, 7.
Hamilton: Western New York.

Ptilopora nodosa Hall.

1883. Ptilopora nodosa. Hall, Trans. Albany Institute, X, p. 196 (abstract, 1881, p. 196).
1884. Ptilopora nodosa. Hall, Rep. State Geologist New York for the year 1883, p. 59.

Ptilopora nodosa Hall—Continued.

1887. Ptilopora nodosa. Hall and Simpson, Pal. New York, VI, p. 285, pl. lxvi, 25.

1891. Ptilopora nodosa. Hall, Tenth Ann. Rep. State Geologist New York for the year 1890, p. 57; Forty-fourth Ann. Rep. New York State Museum, p. 87.

1897. Ptilopora nodosa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. viii, 5.

Hamilton: Near Alden, New York.

Ptilopora paupera Ulrich.

1888. Ptilopora paupera. Ulrich, Bull. Denison Univ., IV, p. 74.

1890. Ptilopora paupera. Ulrich, Geol. Sur. Illinois, VII, p. 624, pl. lxvi, 10.

Waverly: Lodi, Ohio.

Keokuk: Kings Mountain, Kentucky.

Ptilopora prouti Hall.

1858. Ptilopora prouti. Hall, Pal. Iowa, p. 653, pl. xxii, 6*a*–*c*, 7.

1890. Ptilopora prouti. Ulrich, Geol. Sur. Illinois, VIII, p. 625, pl. lxv, 3–3*c*.

1894. Ptilopora prouti. Keyes, Missouri Geol. Sur., V, p. 32.

Warsaw: Barretts Station, Missouri; Warsaw, near New Providence, and Monroe County, Illinois.

Ptilopora striata Hall.

1883. Ptilopora striata. Hall, Trans. Albany Institute, X, p. 196 (abstract, 1881, p. 196).

1884. Ptilopora striata. Hall, Rep. State Geologist New York for the year 1883, p. 58.

1887. Ptilopora striata. Hall and Simpson, Pal. New York, VI, p. 283, pl. lxvi, 30–33.

1891. Ptilopora striata. Hall, Tenth Ann. Rep. State Geologist New York for the year 1890, p. 56; Forty-fourth Ann. Rep. New York State Museum, p. 86.

1897. Ptilopora striata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. viii, 2, 3.

1898. Ptilopora striata. Whiteaves, Contr. Canadian Pal., I, p. 379.

Hamilton: Moscow and other localities in central and western New York; West Williams, Ontario.

Ptilopora valida Ulrich.

1890. Ptilopora valida. Ulrich, Geol. Sur. Illinois, VIII, p. 623, pl. lxv, 5–5*b*, pl. lxvi, 1-1*b*.

1894. Ptilopora valida, Keyes, Missouri Geol. Sur., V, p. 32.

Keokuk: Bentonsport and Keokuk, Iowa; Jersey County, Illinois.

PTILOPORELLA Hall. Genotype: Fenestella (Ptiloporella) laticrescens Hall.

1885. Ptyloporella. Hall, Rep. State Geologist New York for the year 1884, p. 36.

1887. Ptiloporella. Hall and Simpson, Pal. New York, VI, p. xxiv.

1889. Ptiloporella. Miller, North American Geol. Pal., p. 319.

1895. Ptiloporella. Simpson, Thirteenth Ann. Rep. State Geologist New York for the year 1893, pp. 690, 704, 725; Forty-seventh Ann. Rep. New York State Museum, pp. 884, 898, 919. (On p. 704 (p. 898 of Museum Report) Simpson has inadvertently interchanged the terms Ptiloporella and Ptiloporina.)

PTILOPORELLA Hall—Continued.

1897. Ptiloporella. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pp. 506, 521.
1895. Pinnaporina. Simpson, Thirteenth Ann. Rep. State Geologist New York for the year 1893, p. 705 (not p. 725 = **Ptiloporina**); Forty-seventh Ann. Rep. New York State Museum, p. 899 (not p. 919).
1897. Pinnaporella. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pp. 507, 521.

Ptiloporella ? bifurca (Ulrich).

1886. Fenestella bifurca. Ulrich, Contr. American Pal., I, p. 6, pl. i, 2, 2*a*.
1887. Fenestella confertipora. Hall and Simpson, Pal. New York, VI, p. 108, pl. xlvi, 7-11, 17-21.
Hamilton: Falls of the Ohio.

Ptiloporella inæqualis (Hall and Simpson).

1887. Fenestella (Ptiloporella) inæqualis. Hall and Simpson, Pal. New York, VI, p. 171.
1897. Ptiloporella inæqualis. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. iv, 1, 2.
Upper Helderberg: Walpole, Ontario.

Ptiloporella laticrescens (Hall and Simpson).

1887. Fenestella (Ptiloporella) laticrescens. Hall and Simpson, Pal. New York, VI, p. 171.
1897. Ptiloporella laticrescens. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. iv, 3-6.
Upper Helderberg: Walpole, Ontario.

Ptiloporella nervata (Nicholson).

1875. Fenestella nervata. Nicholson, Pal. Ohio, II, p. 264, pl. xxv, 11, 11*a*.
1889. Ptiloporella nervata. Miller, North American Geol. Pal., p. 319.
Niagara: Cedarville, Ohio.

PTILOPORINA Hall. Genotype: Fenestella (Ptyloporina) conica Hall.

1885. Ptyloporina. Hall, Rep. State Geologist New York for the year 1884, p. 36.
1887. Ptiloporina. Hall and Simpson, Pal. New York, VI, p. xxiv.
1889. Ptiloporina. Miller, North American Geol. Pal., p. 319.
1895. Ptiloporina. Simpson, Thirteenth Ann. Rep. State Geologist New York for the year 1893, pp. 690, 725; Forty-seventh Ann. Rep. New York State Museum, pp. 884, 919.
1897. Ptiloporina. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pp. 507, 521. (Makes genotype **Ptiloporina sinistralis**.)
1895. Pinnaporella. Simpson, Thirteenth Ann. Rep. State Geologist New York for the year 1893, pp. 704, 725.
1895. Pinnaporina. Simpson, Thirteenth Ann. Rep. State Geologist New York for the year 1893, p. 725 (not p. 705 = Ptiloporella); Forty-seventh Ann. Rep. New York State Museum, p. 919, (not p. 899).
1897. Pinnaporina. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 507.

Ptiloporina conica (Hall and Simpson).

1887. Fenestella (**Ptiloporina**) conica. Hall and Simpson, Pal. New York, VI, p. 172, pl. xliii, 2-4.
1897. Ptiloporina conica. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. iv, 8.
Upper Helderberg: Schoharie, New York.

Ptiloporina disparilis (Hall and Simpson).

1887. Fenestella (Ptiloporina) disparilis. Hall and Simpson, Pal. New York, VI, p. 173, pl. xliii, 7, 8.

1897. Ptiloporina disparilis. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. iv, 11, 12.

Upper Helderberg: Walpole, Ontario.

Ptiloporina pinnata (Hall and Simpson).

1887. Fenestella (Ptiloporina) pinnata. Hall and Simpson, Pal. New York, VI, p. 172, pl. xliii, 5, 6.

1897. Pinnaporina pinnata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. iv, 7.

1897. Ptiloporina pinnata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. viii, 1.

Upper Helderberg: Schoharie, New York.

Ptiloporina sinistralis (Hall and Simpson).

1887. Fenestella (Ptiloporina) sinistralis. Hall and Simpson, Pal. New York, VI, p. 174, pl. xliii, 9.

1897. Ptiloporina sinistralis. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. iv, 9, 10.

Upper Helderberg: Schoharie, New York.

PTILOTRYPA Ulrich. Genotype: Ptilotrypa obliquata Ulrich.

1890. Ptilotrypa. Ulrich, Geol. Sur. Illinois, VIII, p. 393.

1889. Ptilotrypa. (Ulrich, in press), Miller, North American Geol. Pal., p. 320.

1897. Ptilotrypa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 542.

Ptilotrypa obliquata Ulrich.

1890. Ptilotrypa obliquata. Ulrich, Geol. Sur. Illinois, VIII, p. 531, pl. xxx, 1-1*e*.

1897. Ptilotrypa obliquata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 100-103 (p. 542).

Cincinnati (Richmond): Wilmington, Illinois.

Ptychonema Hall. See Monotrypa Nicholson.

Ptychonema Helderbergiæ Hall. See Monotrypa ? helderbergiæ (Hall).

Ptychonema tabulatum Miller. See Monotrypa tabulata (Hall).

RAMIPORA Toula. Genotype: Ramipora hochstetteri Toula (from the Carboniferous of Spitzbergen).

1875. Ramipora. Toula, Neues Jahrbuch für Mineral., p. 230.

1878. Ramipora. Etheridge, Jun., Quar. Jour. Geol. Soc. London, XXXIV, p. 625.

1885. Ramipora. Waagen and Pichl, Pal. Indica, Ser. XIII, p. 775.

1889. Ramipora. Miller, North American Geol. Pal., p. 320.

1895. Ramipora. Whidborne, Devon. Fauna England, (Pal. Soc. Publ.), II, part 4, p. 186.

Obs. No species from the continent of North America has yet been described properly referable to this genus.

REPTARIA Rolle. Genotype: Reptaria stolonifera Rolle.

1851. Reptaria. Rolle, Leonhard und Bronn's Neues Jahrbuch, p. 810.

1887. Reptaria. Hall and Simpson, Pal. New York, VI, p. xxv.

1889. Reptaria. Miller, North American Geol. Pal., p. 320.

REPTARIA Rolle—Continued.

1897. Reptaria. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 599.
1899. Reptaria. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 178.
1883. Ptilionella. Hall, Trans. Albany Institute, X, p. 599 (abstract, 1881, p. 195).

Reptaria nodata (Hall).

1883. Ptilionella nodata. Hall, Trans. Albany Institute, X, p. 195 (abstract, 1881, p. 195).
1884. Ptilionella nodata. Hall, Rep. State Geologist New York for the year 1883, p. 57.
1887. Reptaria nodata. Hall and Simpson, Pal. New York, VI, p. 276.
Hamilton: Hopeton, Yates County, and Genesee Valley, Livingston County, New York.

Reptaria stolonifera Rolle.

1851. Reptaria stolonifera. Rolle, Leonhard und Bronn's Neues Jahrbuch, p. 810, pl. ix, 5, 6.
1887. Reptaria stolonifera. Hall and Simpson, Pal. New York, VI, p. 274, pl. lxv, 17–19.
1897. Reptaria stolonifera. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxv, 8, 9.
1899. Reptaria stolonifera. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 178, fig. 76.
1883. Ptilionella penniformis. Hall, Trans. Albany Institute, X, p. 195 (abstract, 1881, p. 195).
1884. Ptilionella penniformis. Hall, Rep. State Geologist New York for the year 1883, p. 56.
Hamilton: Cazenovia and Eighteenmile Creek, New York.

Retepora Lamarck. Not Paleozoic.

1874. Retepora (not Lamarck). Nicholson, Pal. Province Ontario, p. 101.
1885. Retepora (not Lamarck). Hall, Rep. State Geologist New York for the year 1884, p. 35.
Obs. The Retepora of most American authors is the genus Phylloporina.

Retepora angulata Hall. See Phylloporina angulata (Hall).

Retepora archimedes Owen. See Archimedes wortheni Hall.

Retepora asperato-striata Hall. See Phylloporina asperato-striata (Hall).

Retepora clintonii Vanuxem. Not defined.

1842. Retepora clintonii. Vanuxem, Geol. Rep. Third District New York, p. 87.
Clinton: No locality given.

Retepora diffusa Hall. See Drymotrypa diffusa (Hall).

Retepora fenestrata Hall. See Phylloporina fenestrata (Hall).

Retepora foliacea Hall. Abandoned by the author; fragment of some fossil not a bryozoan.

1847. Retepora foliacea. Hall, Pal. New York, I, p. 78, pl. xxvi, 9*a*, *b*.
Trenton: Lowville, Lewis County, New York.

Retepora flexuosa D'Orbigny. Not recognizable without material.

1842. Retepora flexuosa. D'Orbigny, Voyage dans l'Amérique Méridionale, III, p. 57, pl. vi, 6–8.
Carboniferous: Yarbichambi, Bolivia.

Retepora gracilis Hall. See Phylloporina gracilis (Hall).

Retepora hamiltonensis Prout. See Reteporina hamiltonensis (Prout).

Retepora incepta Hall. See Phylloporina incepta (Hall).

Retepora Phillipsi Nicholson. See Reteporina phillipsi (Nicholson).

Retepora prisca (Goldfuss?) Nicholson. See Reteporina prisca (Goldfuss?) (Nicholson).

Retepora Trentonensis Nicholson. See Phylloporina trentonensis (Nicholson).

Reteporella Simpson. See Reteporidra.

Reteporella adnata Simpson. See Reteporidra adnata (Hall).

Reteporella undulata Simpson. See Reteporidra perundata (Hall).

RETEPORIDRA.[1] Genotype: Reteporella undulata Simpson = Fenestella perundata Hall.

1895. Reteporella. Simpson, Thirteenth Ann. Rep. State Geologist New York for the year 1893, pp. 702, 725; Forty-seventh Ann. Rep. New York State Museum, pp. 896, 919.

1897. Reteporella. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pp. 503, 521.

1897. Anastomopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pp. 517, 522.

Obs. Anastomopora was made for species resembling Reteporella, but differing in having thickened margins. This is a variable character in this group of species and is of no importance, either specifically or generically. Some specimens of Reteporidra show thickened margins.

Reteporidra adnata (Hall).

1883. Fenestella adnata. Hall, Trans. Albany Institute, X, p. 167 (abstract, 1881, p. 25).

1886. Fenestella (Polypora) adnata. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xli, 1-8, 10.

1887. Fenestella (Polypora) adnata. Hall and Simpson, Pal. New York, VI, p. 152, pl. xli, 1-8, 10.

1897. Reteporella adnata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. i, 4, 5.

Hamilton: Falls of the Ohio.

Reteporidra cinctuta (Hall).

1884. Fenestella cinctuta. Hall, Thirty-sixth Ann. Rep. New York State Museum, p. 62.

1885. Lyropora cinctura. Hall, Rep. State Geologist New York for the year 1884, pl. i, 2.

1887. Fenestella (Lyropora) cinctuta. Hall, Sixth Ann. Rep. State Geologist New York for the year 1886, p. 69.

1888. Fenestella (Lyropora) cinctuta. Hall, Seventh Ann. Rep. State Geologist New York for the year 1887, pl. ix, 16; Forty-first Ann. Rep. New York State Museum, pl. ix, 16.

1897. Anastomopora cinctuta. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. ix, 20-23.

1890. Phyllopora ? sp. undet. Ulrich, Geol. Sur. Illinois, VIII, pl. lv, 10.

Hamilton: Geneseo, New York; West Williams and Widder, Ontario.

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[1] Proposed for Reteporella, preoccupied by Busk. See Challenger Report X, 1884, p. 126.

Reteporidra perundata (Hall).

1883. Fenestella perundata. Hall, Trans. Albany Institute, X, p. 169 (abstract, 1881, p. 27).
1883. Fenestella (Polypora) perundata. Hall, Rep. State Geologist New York for the year 1882, pl. xxxi, 7-13.
1885. Polypora perundata. Hall, Rep. State Geologist New York for the year 1884, pl. i, 3.
1887. Fenestella (Polypora) perundata. Hall and Simpson, Pal. New York, VI, p. 163, pl. xxxviii, 7-13.
1890. Phyllopora superba. Ulrich, Geol. Sur. Illinois, VIII, p. 613, pl. xliv, 6-6c, pl. lv, 9, 9a.
1897. Reteporella undulata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. i, 1-3.
Hamilton: Erie County, New York.
Obs. Hall and Simpson give this as occurring in the Upper Helderberg at Walpole, Ontario, but this is very probably an error.

RETEPORINA D'Orbigny. Genotype: **Retepora prisca Goldfuss.**

1850. Reteporina. D'Orbigny, Prodr. de Pal., I, p. 101.
1885. Reteporina. Hall, Rep. State Geologist New York for the year 1884, p. 35.
1889. Reteporina. Miller, North American Geol. Pal., p. 320.
1894. Reteporina. Počta, Syst. Sil. Bohême, VIII, t. 1, p. 80.
1895. Reteporina. Simpson, Thirteenth Ann. Rep. State Geologist New York for the year 1893, p. 725; Forty-seventh Ann. Rep. New York State Mus., p. 919.
1897. Reteporina. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pp. 504, 521.
1899. Reteporina. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 161.

Reteporina coalescens (Hall and Simpson).

1887. Fenestella (Reteporina) coalescens. Hall and Simpson, Pal. New York, VI, p. 120.
Upper Helderberg: Walpole, Ontario.

Reteporina flexuosa (Ulrich).

1890. Fenestella flexuosa. Ulrich, Geol. Sur. Illinois, VIII, p. 548, pl. li, 4-4c.
1894. Fenestella flexuosa. Keyes, Missouri Geol. Surv., V, p. 24.
Chester: Sloans Valley, Kentucky.

Reteporina hamiltonensis (Prout).

1866. Retepora hamiltonensis. Prout, Trans. St. Louis Acad. Sci., II, p. 412.
1866. Polypora Hamiltonensis. Prout, Geol. Surv. Illinois, II, p. 423, pl. xxi, 6, 6a.
1876-7. Protoretepora (Polypora) hamiltoniana. De Koninck, Rech. sur les Foss. Paleoz. de la Nouv. Galles des Sud, III, p. 179; 1898, Engl. transl., Mem. Geol. Surv. New South Wales, Pal., No. 6, p. 137.
1889. Reteporina hamiltonensis. Miller, North American Geol. Pal., p. 320.
Hamilton: Buffalo, Iowa; Rock Island, Illinois.

Reteporina pertollata Hall (not defined).

1885. Reteporina pertollata. Hall, Rep. State Geologist New York for the year 1884, pl. i, 1.

Reteporina perundulata (Hall).

1884. Fenestella perundulata. Hall, Thirty-sixth Ann. Rep. New York State Mus., p. 63.
1887. Fenestella perundulata. Hall, Sixth Ann. Rep. State Geologist New York for the year 1886, p. 43, pl. ii, 1-14.
1889. Reteporina perundulata. Miller, North American Geol. Pal., p. 320.

Reteporina perundulata (Hall)—Continued.

1897. Reteporina perundulata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. i, 8.
Hamilton: Moscow, New York.

Reteporina phillipsi (Nicholson).

1874. Retepora Phillipsi. Nicholson, Geol. Mag., new ser., I, p. 163, pl. ix, 21.
1874. Retepora Phillipsi. Nicholson, Pal. Province Ontario, p. 102, fig. 39.
1889. Reteporina phillipsi. Miller, North American Geol. Pal., p. 320.
Upper Helderberg: Port Colborne, Ontario.

Reteporina prisca (Goldfuss ?) (Nicholson).

1826. Retepora prisca. Goldfuss, Petref. Germaniæ, p. 103, pl. xxxvi, 19.
1874. Retepora prisca Goldfuss. Nicholson, Pal. Province Ontario, p. 101, fig. 38.
1889. Reteporina prisca. Miller, North American Geol. Pal., p. 320.
1898. Retepora prisca (Goldfuss) Nicholson. Whiteaves, Contr. Canadian Pal., I, part V, p. 379.
Upper Helderberg: Ridgeway and Port Colborne, Ontario.
Hamilton: Arkona, Ontario.
Obs. It is scarcely probable that Nicholson's specimens are cospecific with Goldfuss's.

Reteporina rhombifera (Hall).

1883. Fenestella rhombifera. Hall, Trans. Albany Institute, X, p. 174 (abstract, 1881, p. 32).
1886. Fenestella rhombifera. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. l, 18, 19.
1887. Fenestella (Reteporina) rhombifera. Hall and Simpson, Pal. New York, VI, p. 120, pl. l, 18, 19.
Upper Helderberg: Ontario, Canada. (In the Trans. Albany Institute, X, p. 174, the locality is given as Le Roy, New York.)

Reteporina striata (Hall).

1884. Fenestella strata. Hall, Thirty-sixth Ann. Rep. New York State Mus., p. 72.
1887. Fenestella (Reteporina) striata. Hall, Sixth Ann. Rep. State Geologist New York for the year 1886, p. 45, pl. iii, 1–6.
1897. Reteporina striata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. i, 6, 7.
1899. Reteporina striata. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 161, fig. 50.
Hamilton: Moscow, New York.

RHABDOMESON Young and Young. Genotype: Millepora gracilis Phillips.

1874. Rhabdomeson. Young and Young, Ann. Mag. Nat. Hist., ser 4, XIII, p. 337.
1875. Rhabdomeson. Young and Young, Ann. Mag. Nat. Hist., ser. 4, XV, p. 334.
1885. Rhabdomeson. Vine, Proc. Yorkshire Geol. Polyt. Soc., IX, p. 91.
1890. Rhabdomeson. Ulrich, Geol. Surv. Illinois, VIII, p. 402.
Obs. No American species has yet been referred to this genus.

RHINIDICTYA Ulrich. Genotype: Rhinidictya nicholsoni Ulrich.

1847. Stictopora (in part). Hall, Pal. New York, I, p. 73.
1882. Rhinidictya. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 152.
1887. Rhinidictya. Hall and Simpson, Pal. New York, VI, p. xx.
1889. Rhinidictya. Miller, North American Geol. Pal., p. 320.
1893. Rhinidictya. Ulrich, Geol. Minnesota, III, p. 124.

RHINIDICTYA Ulrich—Continued.

1896. Rhinidictya. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 279.
1897. Rhinidictya. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 605.
1890. Stictopora (not of Hall). Ulrich, Geol. Sur. Illinois, VIII, p. 388.

Rhinidictya basalis (Ulrich).

1882. Stictopora basalis. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 169, pl. viii, 4, 4*a*.
1893. Rhinidictya basalis. Ulrich, Geol. Minnesota, III, p. 128.
Trenton (Stones River): Shelbyville, Tennessee.

Rhinidictya exigua Ulrich.

1890. Rhinidictya exigua. Ulrich, Jour. Cincinnati Soc. Nat. Hist., XII, p. 184, fig. 9.
1893. Rhinidictya exigua. Ulrich, Geol. Minnesota, III, p. 131, pl. viii, 6–10.
Trenton (Stones River and Black River): Minneapolis, St. Paul, and Fountain, Minnesota.

Rhinidictya fenestrata (Hall).

1847. Stictopora fenestrata. Hall, Pal. New York, I, p. 16, pl. iv, 4*a–e*.
1850. Sulcopora fenestrata. D'Orbigny, Prodr. de Pal., I, 22.
1890. Rhinidictya fenestrata. Ulrich, Geol. Sur. Illinois, VIII, p. 492.
Chazy: Chazy and Galway, New York.

Rhinidictya fidelis (Ulrich).

1886. Stictopora fidelis (in part). Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Surv. Minnesota, p. 68.
1893. Rhinidictya fidelis. Ulrich, Geol. Minnesota, III, p. 134, pl. vi, 7–7*b*, 8.
1893. Eurydictya multipora (in part). Ulrich, Geol. Minnesota, III, p. 139, pl. vii, 24, 29–31.
Trenton (Stones River): Minneapolis, Minnesota.

Rhinidictya grandis Ulrich.

1893. Rhinidictya grandis. Ulrich, Geol. Minnesota, III, p. 136, pl. v, 11, 12, pl. vi, 19, 20.
Trenton (Stones River): Dixon, Illinois; Beloit, Mineral Point, and Janesville, Wisconsin.

Rhinidictya ? granulosa Hall and Simpson. See Dicranopora granulosa (Hall).

Rhinidictya granulosa Simpson. See Dicranopora granulosa (Hall).

Rhinidictya humilis Ulrich. See Pachydictya pumila Ulrich.

Rhinidictya lata (Ulrich).

1882. Dicranopora lata. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 166, pl. vi, 16, 16*a*.
Cincinnati (Richmond): Oxford and Clarksville, Ohio.

Rhinidictya minima Ulrich.

1890. Rhinidictya minima. Ulrich, Jour. Cincinnati Soc. Nat. Hist., XII, p. 183, fig. 8.
1893. Rhinidictya minima. Ulrich, Geol. Minnesota, III, p. 132, pl. v, 13–18.
Trenton: Cannon Falls, Minnesota.

Rhinidictya minima-modesta Ulrich.

1893. Rhinidictya minima var. modesta. Ulrich, Geol. Minnesota, III, p. 133, pl. v, 17.
Trenton: Cannon Falls, Minnesota.

Rhinidictya mutabilis (Ulrich).

1886. Stictopora mutabilis (in part). Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Sur. Minnesota, p. 66.
1889. Stictopora mutabilis. Miller, North American Geol. Pal., fig. 517 (p. 324).
1890. Stictopora mutabilis. Ulrich, Geol. Sur. Illinois, VIII, figs. 2*c*–*h* (p. 304).
1893. Rhinidictya mutabilis. Ulrich, Geol. Minnesota, III, p. 125, pl. vi, 1–6, 12, 13, pl. vii, 10–23, 25–28, pl. viii, 1–3.
1897. Rhinidictya mutabilis. Whiteaves, Pal. Foss, III, p. 240.
1886. Stictopora mutabilis var. minor. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Sur. Minnesota, p. 67.

Trenton (Stones River, Black River, and Trenton): Minneapolis, St. Paul, Cannon Falls, and other localities in Minnesota; Decorah, Iowa.

Rhinidictya mutabilis-major (Ulrich).

1886. Stictopora mutabilis var. major. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Sur. Minnesota, p. 66.
1893. Rhinidictya mutabilis var. major. Ulrich, Geol. Minnesota, III, p. 127, pl. vii, 22, 23, 25–28, 32.

Trenton (Black River): St. Paul, Minneapolis, and Cannon Falls, Minnesota.

Rhinidictya mutabilis-senilis Ulrich.

1893. Rhinidictya mutabilis var. senilis. Ulrich, Geol. Minnesota, III, p. 127, pl. vi, 2, 3, pl. vii, 16, 17.

Trenton (Black River): St. Paul, Minnesota.

Rhinidictya nashvillensis (Miller).

1880. Bythopora nashvillensis. Miller, Jour. Cincinnati Soc. Nat. Hist., III, p. 143, pl. iv, 4, 4*a*.
1889. Bythopora nashvillensis. Miller, North American Geol. Pal., fig. 462 (p. 295).
1890. Rhinidictya nashvillensis. Ulrich, Jour. Cincinnati Soc. Nat. Hist., XII, p. 185.

Trenton: Near Nashville, Tennessee (?).

Obs. The locality given above is probably incorrect. The species occurs in the Pierce limestone (Stones River) at Murfreesboro, Tennessee.

Rhinidictya neglecta Ulrich.

1886. Stictopora paupera (in part). Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Sur. Minnesota, p. 69.
1893. Rhinidictya neglecta. Ulrich, Geol. Minnesota, III, p. 130, pl. v., 22–25.

Trenton: Frankfort, Boyle, and Mercer counties, Kentucky; Nashville, Tennessee; St. Paul, Minnesota.

Rhinidictya neglecta-canadensis Ulrich.

1893. Rhinidictya neglecta var. canadensis. Ulrich, Geol. Minnesota, III, p. 130.

Trenton: Ottawa, Canada.

Rhinidictya nicholsoni Ulrich.

1882. Rhinidictya nicholsoni. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 170, pl. viii, 6–6*b*.
1889. Rhinidictya nicholsoni. Miller, North American Geol. Pal., fig. 507 (p. 320).

Trenton (Stones River): High Bridge, Kentucky.

Rhinidictya obliqua (Ulrich) Whiteaves.

1897. Rhinidictya obliqua Ulrich. Whiteaves, Pal. Foss., III, p. 240.
Trenton: Deer Island, Lake Winnipeg, Canada.
Obs. Though unquestionably distinct, this species requires further work before it can be regarded as valid.

Rhinidictya parallela (James).

1878. Ptilodictya parallela. James, Paleontologist, No. 1, p. 5.
1882. Rhinidictya parallela. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 170.
1878. Ptilodictya granulosa. James, Paleontologist, No. 1, p. 4.
Cincinnati (Utica): Cincinnati, Ohio, and vicinity.
Obs. Although the description of P. granulosa precedes that of P. parallela, the latter name much better defines the usual appearance of the species, and therefore deserves to be the one retained.

Rhinidictya paupera Ulrich.

1886. Stictopora paupera (in part). Fourteenth Ann. Rep. Geol. Nat. Hist. Surv. Minnesota, p. 69.
1893. Rhinidictya paupera. Ulrich, Geol. Minnesota, III, p. 129, pl. v, 19–21.
Trenton (Black River): St. Paul and Cannon Falls, Minnesota; Decorah, Iowa.

Rhinidictya pediculata Ulrich.

1893. Rhinidictya pediculata. Ulrich, Geol. Minnesota, III, p. 137, pl. vii, 1–5.
Trenton (Stones River): Minneapolis, Minnesota.

Rhinidictya trentonensis (Ulrich).

1882. Dicranopora trentonensis. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 167, pl. vi, 15, 15*a*.
1893. Rhinidictya trentonensis. Ulrich, Geol. Minnesota, III, p. 135, pl. vi, 14–18, pl. vii, 6–9.
1886. Stictopora fidelis (in part). Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Sur. Minnesota, p. 68.
Trenton (Stones River): Lebanon, Tennessee; Minneapolis, Minnesota; Janesville, Wisconsin; Rockton, Illinois.

RHINOPORA Hall. Genotype: Rhinopora verrucosa Hall.

1852. Rhinopora. Hall, Pal. New York, II, p. 48.
1887. Rhinopora. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 166.
1889. Rhinopora. Miller, North American Geol. Pal., p. 321.
1890. Rhinopora. Ulrich, Geol. Surv. Illinois, VIII, p. 388.
1896. Rhinopora. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 280.
1897. Rhinopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 540.

Rhinopora curvata Ringueberg. See Rhinopora verrucosa Hall.

Rhinopora frondosa Hall and Whitfield. See Rhinopora verrucosa Hall.

Rhinopora prima Whitfield.

1897. Rhinopora prima. Whitfield, Bull. American Mus. Nat. Hist., IX, p. 177, pl. iv, 5, 6.
Calciferous: Fort Cassin, Vermont.
Obs. This is probably not a bryozoan.

Rhinopora ? tuberculosa Hall.

1852. Rhinopora tuberculosa. Hall, Pal. New York, II, p. 170, pl. xlE, 4*a*–*c*.
Niagara: Lockport, New York.

Rhinopora ? tubulosa Hall.

1852. Rhinopora tubulosa. Hall, Pal. New York, II, p. 49, pl. xix, 2*a–c*.
Clinton: Sodus, Wayne County, and Reynales Basin, New York.

Rhinopora venosa Spencer. See Rhinopora verrucosa Hall.

Rhinopora verrucosa Hall.

1852. Rhinopora verrucosa. Hall, Pal. New York, II, p. 48, pl. xix, 1*a–c*.
1874. Rhinopora verrucosa. Nicholson and Hinde, Canadian Jour., new ser., XIV, p. 141.
1875. Rhinopora verrucosa. Nicholson, Pal. Province Ontario, p. 44, fig. 19, 1, 1*a*.
1887. Rhinopora verrucosa. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 166; ibid., III, 1888, pl. xv, 13.
1889. Rhinopora verrucosa. Foerste, Proc. Boston Soc. Nat. Hist., xxiv, p. 332.
1895. Rhinopora verrucosa. Foerste, Geol. Surv. Ohio, VII, p. 599, pl. xxviii, 13*a–c*.
1875. Escharina ? distorta. James, Paleontologist, No. 3, p. 21.
*1884. Rhinopora venosa. Spencer, Trans. St. Louis Acad. Sci., IV, p. 604, pl. vii, 3.
*1884. Rhinopora venosa. Spencer, Bull. Mus. Univ. State Missouri, I, p. 54, pl. vii, 3.
*1886. Rhinopora curvata. Ringueberg, Bull. Buffalo Soc. Nat. Hist., V, p. 19, pl. ii, 14.
Clinton: Flamboro Head and Dundas, Canada; Cumberland Gap, Tennessee; Collinsville, Alabama; Hanover, Indiana (Foerste); Dayton, Fair Haven, Todds Fork, and Yellow Springs, Ohio.
Obs. The citations preceded by the (*) refer to very poor descriptions of poorly preserved fossils, but there is scarcely any doubt but that the names are synonyms.

RHOMBOPORA Meek. Genotype: Rhombopora lepidodendroides Meek.

1872. Rhombopora. Meek, Pal. Eastern Nebraska, p. 141.
1877. Rhombopora. Etheridge, Jun., Ann. Mag. Nat. Hist., ser. 4, XX, p. 36.
1883. Rhombopora. Vine, Proc. Yorkshire Geol. Polyt. Soc., VIII, p. 105.
1884. Rhombopora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, p. 26.
1885. Rhombopora. Vine, Proc. Yorkshire Geol. Polyt. Soc., IX, p. 93.
1887. Rhombopora. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 71.
1889. Rhombopora. Miller, North American Geol. Pal., p. 321.
1890. Rhombopora. Ulrich, Geol. Surv. Illinois, VIII, pp. 402, 647.
1896. Rhombopora. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 281.
1897. Rhombopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 550.
1899. Rhombopora. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 164.
Vincularia of some foreign authors.

Rhombopora angustata Ulrich.

1890. Rhombopora angustata. Ulrich, Geol. Surv. Illinois, VIII, p. 652, pl. lxx, 6, 6*a*.
Keokuk: Kings Mountain, Kentucky.

Rhombopora armata Ulrich.

1884. Rhombopora armata. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, p. 31, pl. i, 5, 5*a*.
Chester: Sloans Valley, Kentucky.

Rhombopora ? asperrima (Ulrich, in press) Miller. See Rhombopora ? asperula Ulrich.

Rhombopora ? asperula Ulrich.

1890. Rhombopora ? asperula. Ulrich, Geol. Surv. Illinois, VIII, p. 656, pl. lxx, 9–9*e*.

1889. Rhombopora ? asperrima (in error for asperula). (Ulrich, in press), Miller, North American Geol. Pal., p. 321.

Keokuk: Keokuk, Iowa; Nauvoo and Warsaw, Illinois.

Rhombopora attenuata Ulrich.

1890. Rhombopora attenuata. Ulrich, Geol. Surv. Illinois, VIII, p. 655, pl. lxx, 7.

1894. Rhombopora attenuata. Keyes, Missouri Geol. Surv., V, p. 34.

Keokuk: Warsaw, Illinois.

Rhombopora confluens Ulrich. See **Acanthoclema confluens** (Ulrich).

Rhombopora crassa Ulrich.

1884. Rhombopora crassa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, p. 28, pl. i, 2–2*b*.

1894. Rhombopora crassa. Keyes, Missouri Geol. Surv., V, p. 34.

Coal Measures: Kansas City, Missouri.

Rhombopora decipiens Ulrich.

1890. Rhombopora decipiens. Ulrich, Geol. Surv. Illinois, VIII, p. 657, pl. lxxi, 3–3*d*.

St. Louis: Monroe County, Illinois.

Rhombopora dichotoma Ulrich.

1890. Rhombopora dichotoma. Ulrich, Geol. Surv. Illinois, VIII, p. 650, pl. lxx, 13–13*b*.

1894. Rhombopora dichotoma. Keyes, Missouri Geol. Surv., V, p. 33.

Burlington: Burlington, Iowa.

Keokuk: Warsaw, Illinois.

Rhombopora elegantula Ulrich.

1884. Rhombopora elegantula. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, p. 33, pl. i, 3–3*b*.

1890. Anisotrypa elegantula. Ulrich, Geol. Surv. Illinois, VIII, p. 447.

Keokuk: Kings Mountain, Kentucky.

Rhombopora exigua Ulrich.

1890. Rhombopora exigua. Ulrich, Geol. Surv. Illinois, VIII, p. 651, pl. lxx, 10, 10*a*.

Burlington: Burlington, Iowa.

Rhombopora exilis (Dawson).

1868. Stenopora exilis. Dawson, Acadian Geology, p. 287.

1878. Stenopora exilis. Dawson, Acadian Geology, ed. 3, p. 287, fig. 85*a*.

1889. Stenopora exilis. Miller, North American Geol. Pal., fig. 218 (p. 203).

Carboniferous: Windsor and Stewiacke, Nova Scotia.

Rhombopora gracilis Ulrich.

1890. Rhombopora gracilis. Ulrich, Geol. Surv. Illinois, VIII, p. 651, pl. lxx, 11–11*b*.

Burlington: Burlington, Iowa.

Rhombopora granulifera Ulrich. See **Batostomella granulifera** (Hall).

Rhombopora Hamiltonensis Nicholson and Lyddeker. See **Streblotrypa hamiltonensis** (Nicholson).

Rhombopora hexagona Grabau. See **Orthopora hexagona** (Hall and Simpson).

Rhombopora immersa Grabau. See Orthopora immersa (Hall and Simpson).

Rhombopora incrassata Ulrich.

1888. Rhombopora incrassata. Ulrich, Bull. Denison Univ., IV, p. 89, pl. xiv, 16, ? 16*a*.

1890. Rhombopora incrassata. Ulrich, Geol. Surv. Illinois, VIII, p. 652, pl. lxx, 12-12*d*.

Waverly: Lodi, Ohio.

Keokuk: Kings Mountain and Button Mole Knob, near Louisville, Kentucky.

Rhombopora lepidodendroides Meek.

1866. Stenopora columnaris (not of Schlotheim, 1813) (in part). Geinitz, Carb. und Dyas in Nebraska, p. 66.

1872. Rhombopora lepidodendroides. Meek, Pal. Eastern Nebraska, p. 141, pl. vii, 2*a–f*.

1877. Rhombopora lepidodendroides (?). White, Wheeler's United States Geol. Surv., IV, Pal., p. 99, pl. vi, 5*a–d*.

1884. Rhombopora lepidodendroidea. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, p. 27, pl. i, 1-1*b*.

1887. Rhombopora lepidodendroidea. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 73, pl. vii, 3*a*, *b*.

1888. Rhombopora lepidodendroides. Keyes, Proc. Acad. Nat. Sci. Philadelphia, p. 225.

1894. Rhombopora lepidodendroides. Keyes, Missouri Geol. Surv., V, p. 35, pl. xxxiii, 4*a*, *b*.

1896. Rhombopora lepidodendroides. Smith, Proc. American Phil. Soc., XXXV, p. 237.

Coal Measures: Nebraska City and Wyoming, Nebraska. A rather common species at various localities in Nebraska, Kansas, Missouri, Iowa, Illinois, and Ohio.

Rhombopora lineata Grabau. See Orthopora lineata (Hall).

Rhombopora lineinodis Ulrich.

1890. Rhombopora lineinodis. Ulrich, Geol. Surv. Illinois, VIII, p. 649, pl. xlv, 3-3*b*.

Hamilton: Falls of the Ohio.

Rhombopora lineinodis-humilis Ulrich.

1890. Rhombopora lineinodis var. humilis. Ulrich, Geol. Surv. Illinois, VIII, p. 649, pl. xlv, 4, 4*a*.

Hamilton: Falls of the Ohio.

Rhombopora minor Ulrich.

1890. Rhombopora minor. Ulrich, Geol. Surv. Illinois, VIII, p. 659, pl. lxx, 4, 4*a*.

Chester: Sloans Valley and Litchfield, Kentucky.

Rhombopora multipora Foerste.

1887. Rhombopora multipora. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 72, pl. vii, 1*a–c*.

Coal Measures: Flint Ridge, Ohio; Seville, Illinois.

Rhombopora nicklesi Ulrich.

1890. Rhombopora nicklesi. Ulrich, Geol. Surv. Illinois, VIII, p. 661, pl. lxx, 1-1*c*.

Lower Coal Measures: Sparta, Illinois.

Rhombopora ohioensis Ulrich.

1888. Rhombopora ohioensis. Ulrich, Bull. Denison Univ., IV, p. 90, pl. xiv, 15, 15*a*.

1895. Rhombopora ohioensis. Herrick, Geol. Surv. Ohio, VII, pl. xix, 9.
Waverly: Richfield, Lodi, and Moots Run, Ohio.

Rhombopora persimilis Ulrich.

1884. Rhombopora persimilis. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, p. 30, pl. i, 7–7*d*.

1890. Rhombopora persimilis. Ulrich, Geol. Surv. Illinois, VIII, p. 659, pl. lxx, 3.
Chester: Chester, Illinois, and Sloans Valley, Kentucky.

Rhombopora polygona Grabau. See Orthopora polygona (Hall).

Rhombopora pulchella Ulrich.

1884. Rhombopora pulchella. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, p. 31, pl. i, 6, 6*a*.
Chester: Sloans Valley, Kentucky.

Rhombopora regularis Simpson. See Orthopora regularis (Hall).

Rhombopora reticulata Grabau. See Orthopora reticulata (Hall and Simpson).

Rhombopora simulatrix Ulrich.

1890. Rhombopora simulatrix. Ulrich, Geol. Surv. Illinois, VIII, p. 657, pl. lxxi, 2–2*e*.
St. Louis: Columbia and other localities in Monroe County, Illinois.

Rhombopora? spiralis Ulrich.

1890. Rhombopora? spiralis. Ulrich, Geol. Surv. Illinois, VIII, p. 656, pl. lxxi, 5–5*d*.
Keokuk: Kings Mountain, Kentucky.

Rhombopora subannulata Ulrich.

1890. Rhombopora subannulata. Ulrich, Geol. Surv. Illinois, VIII, p. 648, pl. xlv, 1–1*i*.
Hamilton: Buffalo, Iowa.

Rhombopora sulcifera Ulrich.

1890. Rhombopora sulcifera. Ulrich, Geol. Surv. Illinois, VIII, p. 649, pl. xlv, 2–2*b*.
Hamilton: Davenport, Iowa.

Rhombopora tabulata Ulrich.

1890. Rhombopora tabulata. Ulrich, Geol. Surv. Illinois, VIII, p. 658, pl. lxx, 2–2*c*.

1894. Rhombopora tabulata. Keyes, Missouri Geol. Surv., V, p. 34.
Chester: Chester and Kaskaskia, Illinois; Sloans Valley, Kentucky.

Rhombopora tenuirama Ulrich.

1890. Rhombopora tenuirama. Ulrich, Geol. Surv. Illinois, VIII, p. 660, pl. lxx, 8–8*b*.

1894. Rhombopora tenuirama. Keyes, Missouri Geol. Surv., V, p. 34.
Chester: Kaskaskia, Illinois; Sloans Valley, Kentucky.

Rhombopora tortalinea Grabau. See Orthopora tortalinea (Hall).

Rhombopora transversa Grabau. See Orthopora transversa (Hall).

Rhombopora transversa Simpson. See Orthopora hexagona (Hall and Simpson).

Rhombopora transversalis Ulrich.

1890. Rhombopora transversalis. Ulrich, Geol. Surv. Illinois, VIII, p. 654, pl. lxxi, 4–4*b*.

1894. Rhombopora transversalis. Keyes, Missouri Geol. Surv., V, p. 34.

Keokuk: Plymouth, Nauvoo, and Warsaw, Illinois.

Rhombopora varia (Ulrich, in press) Miller. See Rhombopora varians Ulrich.

Rhombopora varians Ulrich.

1890. Rhombopora varians. Ulrich, Geol. Surv. Illinois, VIII, p. 653, pl. lxxi, 1–1*f*.

1889. Rhombopora varia (in error for varians). (Ulrich, in press), Miller North American Geol. Pal., p. 321.

1894. Rhombopora varians. Keyes, Misouri Geol. Surv., V, p. 33.

Keokuk: Near Plymouth, near Whitehall, Warsaw, and Nauvoo, Illinois.

Rhombopora wortheni Urich.

1884. Rhombopora wortheni. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VII, p. 32, pl. i, 4–4*b*.

St. Louis: Somerset, Kentucky.

RHOPALONARIA Ulrich. Genotype: Rhopalonaria venosa Ulrich.

1879. Ropalonaria. Ulrich, Jour. Cincinnati Soc. Nat. Hist., II, p. 26.

1882. Ropalonaria. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V. p. 149.

1884. Ropalonaria. Vine, Ann. Mag. Nat. Hist., ser. 5, XIV, p. 84, fig. iv.

1889. Rhopalonaria. Miller, North American Geol. Pal., p. 321.

1890. Rhopalonaria. Ulrich, Geol. Surv. Illinois, VIII, p. 367.

1897. Rhopalonaria. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 603.

Rhopalonaria pertenuis Ulrich. See Stomatopora delicatula James.

Rhopalonaria venosa Ulrich.

1879. Ropalonaria venosa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., II, p. 26, pl. vii, 24, 24*a*.

1889. Rhopalonaria venosa. Miller, North American Geol. Pal., fig. 511 (p. 321).

1893. Rhopalonaria venosa. Ulrich, Geol. Minnesota, III, p. 114, fig. 8*e*.

1897. Rhopalonaria venosa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 221 (p. 603).

Cincinnati (Lorraine and Richmond): Clarksville, Waynesville, Oregonia and Hanover, Ohio; Versailles, Indiana.

Ropalonaria. See Rhopalonaria.

Rosacilla F. A. Roemer. See Berenicea Lamouroux.

Sagenella Hall. See Berenicea Lamouroux.

Sagenella ambigua Walcott. Not recognizable.

1883. Sagenella ambigua. Walcott, Trans. Albany Institute, X. p. 22, pl. i, 3, 3*a*.

Utica Slate: Trenton, New York.

Sagenella elegans Hall. See Berenicea elegans (Hall).

Sagenella membranacea Hall. See Berenicea membranacea (Hall).

Sagenella striata James. See Escharopora falciformis (Nicholson).

SCALARIPORA Hall. Genotype: **Scalaripora scalariformis Hall.**

1883. Scalaripora. Hall, Trans. Albany Institute, X, p. 159 (abstract, 1881, p. 17).
1887. Scalaripora. Hall and Simpson, Pal. New York, VI, p. xxi.
1889. Scalaripora. Miller, North American Geol. Pal., p. 321.
1890. Scalaripora. Ulrich, Geol. Surv. Illinois, VIII, p. 387.
1897. Scalaripora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 532.

Scalaripora approximata Ulrich.

1890. Scalaripora approximata. Ulrich, Geol. Surv. Illinois, VIII, p. 508, pl. xliii, 3.
Hamilton; Near Alpena, Michigan.

Scalaripora canadensis Whiteaves.

1898. Scalaripora Canadensis. Whiteaves, Contr. Canadian Pal., I, p. 378, pl. xlviii, 10–10*b*.
Hamilton: Thedford, Ontario.

Scalaripora scalariformis Hall.

1883. Scalaripora scalariformis. Hall, Trans. Albany Institute, X, p. 159 (abstract, 1881, p. 18).
1886. Scalaripora scalariformis. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxix, 4–8.
1887. Scalaripora scalariformis. Hall and Simpson, Pal. New York, VI, p. 100, pl. xxix, 4–8.
1897. Scalaripora scalariformis. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xii, 16–20.
Hamilton: Falls of the Ohio.

Scalaripora separata Ulrich.

1890. Scalaripora separata. Ulrich, Geol. Surv. Illinois, VIII, p. 507, pl. xliii, 2.
Hamilton: Thunder Bay, Michigan.

Scalaripora subconcava Hall.

1883. Scalaripora subconcava. Hall, Trans. Albany Institute, X, p. 160 (abstract, 1881, p. 18).
1886. Scalaripora subconcava. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxix, 1–3.
1887. Scalaripora subconcava. Hall and Simpson, Pal. New York, VI, p. 100, pl. xxix, 1–3.
1897. Scalaripora subconcava. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xii, 21, 22.
Hamilton: Falls of the Ohio.

SCENELLOPORA Ulrich. Genotype: **Scenellopora radiata** Ulrich.

1882. Scenellopora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 150.
1889. Scenellopora. Miller, North American Geol. Pal., p. 322.
1890. Scenellopora. Ulrich, Geol. Surv. Illinois, VIII, p. 368.
1896. Scenellopora. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 268.
1897. Scenellopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 593.

Scenellopora radiata Ulrich.

1882. Scenellopora radiata. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 158, pl. vi, 6–6*b*.
1897. Scenellopora radiata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 194, 195 (p. 593).
Trenton (Stones River): Knoxville, Tennessee.

SCEPTROPORA Ulrich. Genotype: Sceptropora facula Ulrich.

1888. Sceptropora. Ulrich, American Geologist, I, p. 228.
1889. Sceptropora. Ulrich, Contr. Micro-Pal. Cambro-Sil., Part II, p. 46.
1889. Sceptropora. Miller, North American Geol. Pal., p. 322.
1890. Sceptropora. Ulrich, Geol. Sur. Illinois, VIII, p. 400.
1896. Sceptropora. Ulrich, Zittel's Textb. Pal. (Eng. ed.), p. 281.
1897. Sceptropora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 548.

Sceptropora facula Ulrich.

1888. Sceptropora facula. Ulrich, American Geologist, I, p. 229, fig. 1.
1889. Sceptropora facula. Ulrich, Contr. Micro-Pal. Cambro-Sil., Part II, p. 46, fig. 2.
1890. Sceptropora facula. Ulrich, Geol. Sur. Illinois, VIII, p. 401, fig. 15.
1895. Sceptropora facula. Whiteaves, Pal. Foss., III, Part II, p. 117.
1897. Sceptropora facula. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 116 (p. 549).

Cincinnati (Richmond): Stony Mountain, Manitoba; Wilmington and Savannah, Illinois.

Sceptropora fustiformis Ulrich.

1889. Sceptropora fustiformis. Ulrich, Contr. Micro-Pal. Cambro-Sil., Part II, p. 46.

Clinton: Hamilton, Ontario.

SELENOPORA Hall. Genotype: Lichenalia circincta Hall.

1886. Selenopora. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, explanation pl. xxv.
1887. Selenopora. Hall and Simpson, Pal. New York, VI, p. xvii.
1889. Selenopora. Miller, North American Geol. Pal., p. 322.
1890. Selenopora. Ulrich, Geol. Sur. Illinois, VIII, p. 384.
1896. Selenopora. Ulrich, Zittel's Textb. Pal. (Eng. ed.), p. 270.
1897. Selenopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 557.

Selenopora circincta (Hall).

1883. Lichenalia circincta. Hall, Trans. Albany Institute, X, p. 153 (abstract, 1881, p. 11).
1886. Selenopora circincta. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxv, 13–15.
1887. Lichenalia (Selenopora) circincta. Hall and Simpson, Pal. New York, VI, p. 86, pl. xxv, 13–15.
1897. Selenopora circincta. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxiv, 4–6.

Hamilton: Falls of the Ohio.

Selenopora complexa (Hall).

1883. Lichenalia complexa. Hall, Trans. Albany Institute, X, p. 153 (abstract, 1881, p. 11).
1886. Lichenalia complexa. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxxi, 19, 20.
1887. Lichenalia (Selenopora) complexa. Hall and Simpson, Pal. New York, VI, p. 87, pl. xxxi, 19, 20.
1897. Selenopora complexata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xxiv, 7.

Hamilton: Falls of the Ohio. (In the Trans. Albany Institute, X, p. 153, the locality is given as Onondaga Valley, New York.)

Selenopora complexata Simpson. See Selenopora complexa (Hall).

SEMICOSCINIUM Prout. Genotype: Semicoscinium rhomboideum Prout.

1859. Semicoscinium. Prout, Trans. St. Louis Acad. Sci., I, p. 443.
1886. Semicoscinium. Ulrich, Contr. American Pal., I, p. 4.
1889. Semicoscinium. Miller, North American Geol. Pal., p. 322.
1890. Semicoscinium. Ulrich, Geol. Sur. Illinois, VIII, pp. 395, 555.
1895. Semicoscinium. Simpson, Thirteenth Ann. Rep. New York State Geologist for the year 1893, p. 705; Forty-seventh Ann. Rep. New York State Mus., p. 899.
1896. Semicoscinium. Ulrich, Zittel's Textb. Pal. (Eng. ed.), p. 281.
1897. Semicoscinium. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 509.
1874. Cryptopora. Nicholson, Canadian Jour., new ser., XIV, p. 131.
1874. Cryptopora. Nicholson, Ann. Mag. Nat. Hist., ser. 4, XIII, p. 77.
1874. Cryptopora. Nicholson, Pal. Province Ontario, p. 102.
1885. Cryptopora. Hall, Rep. State Geologist New York for the year 1884, p. 40.
1886. Cryptopora. Ulrich, Contr. American Pal., I, p. 6.
1874. Carinopora. Nicholson, Canadian Jour., new ser., XIV, p. 132.
1874. Carinopora. Nicholson, Ann. Mag. Nat. Hist., ser. 4, XIII, p. 81.
1874. Carinopora. Nicholson, Pal. Province Ontario, p. 109.
1885. Carinopora. Hall, Rep. State Geologist New York for the year 1884, p. 38.
1886. Carinopora. Ulrich, Contr. American Pal., I, p. 4.
1895. Cycloporina. Simpson, Thirteenth Ann. Rep. State Geologist New York for the year 1893, pp. 711, 725; Forty-seventh Ann. Rep. New York State Mus., pp. 905, 919.
1897. Cycloporina. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pp. 504, 520.

Semicoscinium acmeum (Hall).

1876. Fenestella acmea. Hall, Twenty-eighth Ann. Rep. New York State Mus. (documentary edition), pl. xii, 10–13, 14 (sp.?); ibid. (Museum edition, 1879), p. 124, pl. xii, 10–14.
1882. Fenestella acmea. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist. p. 250, pl. xi, 10–14.
1890. Semicoscinium acmea. Ulrich, Géol. Sur. Illinois, VIII, p. 355.
Niagara: Waldron, Indiana.

Semicoscinium biimbricatum (Hall).

1883. Fenestella biimbricata. Hall, Trans. Albany Institute, X, p. 173 (abstract, 1881, p. 31).
1886. Fenestella biimbricata. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xlviii, 6–11.
1887. Fenestella biimbricata. Hall and Simpson, Pal. New York, VI, p. 122, pl. xlviii, 6–11.
1897. Fenestella biimbricata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. ii, 11.
Hamilton: Falls of the Ohio.

Semicoscinium biserrulatum (Hall).

1883. Fenestella biserrulata. Hall, Trans. Albany Institute, X, p. 172 (abstract, 1881, p. 30).
1886. Fenestella biserrulata. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. l, 6–11.

Semicoscinium biserrulatum (Hall)—Continued.

1887. Fenestella biserrulata. Hall and Simpson, Pal. New York, VI, p. 128, pl. l, 6–11.
Hamilton: Falls of the Ohio.

Semicoscinium ? cleis (Hall).

1879. Fenestella Cleis. Hall, Thirty-second Ann. Rep. New York State Mus., p. 173 (reprint, 1880, p. 35).
Lower Helderberg: Clarksville, New York.

Semicoscinium coronis (Hall).

1879. Fenestella Coronis. Hall, Thirty-second Ann. Rep. New York State Mus., p. 171 (reprint, 1880, p. 33).
1883. Fenestella Coronis. Hall, Rep. State Geologist New York for the year 1882, pl. xxi, 10–13.
1887. Fenestella Coronis. Hall and Simpson, Pal. New York, VI, p. 51, pl. xxi, 10–13.
Lower Helderberg: Clarksville, New York.

Semicoscinium davidsoni (Nicholson).

1875. Fenestella Davidsoni. Nicholson. Geol. Mag., new ser., II, p. 36, pl. ii, 3–3*b*.
1875. Fenestella Davidsoni. Nicholson, Pal. Province of Ontario, p. 81, pl. iii, 3*a*–*c*.
Hamilton: Arkona and Widder, Ontario.

Semicoscinium eriense Prout.

1860. Semicoscinium Eriense. Prout, Trans. St. Louis Acad. Sci., I, p. 579.
Devonian (?): Cunningham Island, Lake Erie.

Semicoscinium exornatum (Hall).

1884. Fenestella exornata. Hall, Thirty-sixth Ann. Rep. New York State Mus., p. 67.
1887. Fenestella exornata. Hall, Sixth Ann. Rep. State Geologist New York for the year 1886, p. 49, pl. iv, 6–13, pl. v, 1–13.
1897. Fenestella exornata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. ii, 7.
1884. Fenestella brevilinea. Hall, Thirty-sixth Ann. Rep. New York State Mus., p. 70.
Hamilton: Alden and Moscow, New York.

Semicoscinium graniferum (Hall).

1883. Fenestella (Hemitrypa) granifera. Hall, Trans. Albany Institute, X, p. 175 (abstract, 1881, p. 33).
1886. Fenestella (Hemitrypa) granifera. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. l, 12–14, 16.
1887. Fenestella granifera. Hall and Simpson, Pal. New York, VI, p. 125, pl. l. 12–14, 16.
Upper Helderberg: Near Le Roy, New York.

Semicoscinium hindei (Nicholson).

1874. Carinopora Hindei. Nicholson, Ann. Mag. Nat. Hist., ser. 4, XIII, p. 84, fig. 2.
1874. Carinopora Hindei. Nicholson, Pal. Province Ontario, p. 111, fig. 48.
Upper Helderberg: Jarvis, Ontario.

Semicoscinium inflexum (Hall).

1884. Fenestella inflexa. Hall, Thirty-sixth Ann. Rep. New York State Mus., p. 64.

Hamilton: West Bloomfield, New York.

Semicoscinium infraporosa Ulrich. See **Fenestrapora infraporosa** (Ulrich).

Semicoscinium interruptum (Hall).

1883. Fenestella interrupta. Hall, Trans. Albany Institute, X, p. 174 (abstract, 1881, p. 32).

1886. Fenestella interrupta. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xlviii, 12–17.

1887. Fenestella interrupta. Hall and Simpson, Pal. New York, VI, p. 123, pl. xlviii, 12–17.

Hamilton: Falls of the Ohio.

Semicoscinium labiatum (Hall).

1885. Fenestella labiata. Hall, Rep. State Geologist New York for the year 1884, pl. ii, 18.

1887. Fenestella hemicycla. Hall, Sixth Ann. Rep. State Geologist New York for the year 1886, p. 55, pl. vii, 12, 15, 16 (not 13, 14).

1895. Cycloporina hemicycla. Simpson, Thirteenth Ann. Rep. State Geologist New York for the year 1893, p. 711; Forty-seventh Ann. Rep. New York State Mus., p. 905.

1897. Cycloporina hemicycla. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 504, pl. iii, 1, 2, 5.

Hamilton: Darien, New York; West Williams, Ontario.

Semicoscinium latijuncturum (Hall).

1883. Fenestella latijunctura. Hall, Trans. Albany Institute, X, p. 173 (abstract, 1881, p. 31).

1886. Fenestella latijunctura. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xlviii, 1–5.

1887. Fenestella latijunctura. Hall and Simpson, Pal. New York, VI, p. 128, pl. xlviii, 1–5.

1897. Fenestella latijunctura. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. ii, 9–10.

Hamilton: Falls of the Ohio.

Semicoscinium lunulatum (Hall).

1883. Fenestella lunulata. Hall, Trans. Albany Institute, X, p. 173 (abstract, 1881, p. 31).

1887. Fenestella lunulata. Hall and Simpson, Pal. New York, VI, p. 121, pl. xlvii, 1–10.

1886. Semicoscinium obliquatum. Ulrich, Contr. American Pal., I, p. 13, pl. i, 5, *5a*.

Hamilton: Falls of the Ohio.

Semicoscinium mirabile (Nicholson).

1874. Cryptopora mirabile. Nicholson, Ann. Mag. Nat. Hist., ser. 4, XIII, p. 79, fig. 1.

1874. Cryptopora mirabile. Nicholson, Pal. Province Ontario, p. 103, fig. 40.

Upper Helderberg: Port Colborne and Wainfleet, Ontario.

Semicoscinium obliquatum Ulrich. See Semicoscinium **lunulatum** (Hall.)

Semicoscinium permarginatum (Hall).

1883. Fenestella permarginata. Hall, Trans. Albany Institute, X, p. 172 (abstract, 1881, p. 30).
1887. Fenestella permarginata. Hall and Simpson, Pal. New York, VI, p. 127, pl. xlix, 1-10.
Hamilton: Falls of the Ohio.

Semicoscinium planodorsatum Ulrich.

1890. Semicoscinium planodorsatum. Ulrich, Geol. Surv. Illinois, VIII, p. 555, pl. xliv, 3-3*b*.
Hamilton: Falls of the Ohio.

Semicoscinium rhombicum Ulrich.

1890. Semicoscinium rhombicum. Ulrich, Geol. Surv. Illinois, VIII, p. 556, pl. xliv, 4, 4*a*, pl. liv, 8.
Hamilton: Buffalo, Iowa.

Semicoscinium rhomboideum Prout.

1859. Semicoscinium rhomboideum. Prout, Trans. St. Louis Acad. Sci., I, p. 443, pl. xvii, 1-1*f*.
1897. Semicoscinium rhomboideum. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 58 (p. 509).
Hamilton: Falls of the Ohio.

Semicoscinium semirotundum (Hall).

1883. Fenestella semirotunda. Hall, Trans. Albany Institute, X, p. 174 (abstract, 1881, p. 32).
1887. Fenestella semirotunda. Hall and Simpson, Pal. New York, VI, p. 125, pl. xlix, 11-22.
1897. Cycloporina semirotunda. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. iii, 3, 4.
1895. Cycloporina rhomboidea. Simpson, Thirteenth Ann. Rep. State Geologist New York for the year 1893, p. 711; Forty-seventh Ann. Rep. New York State Mus., p. 905.
Hamilton: Falls of the Ohio.

Semicoscinium subtortile (Hall).

1884. Fenestella subtortilis. Hall, Thirty-sixth Ann. Rep. New York State Mus., p. 71.
1887. Fenestella subtortilis. Hall, Sixth Ann. Rep. State Geologist New York for the year 1886, p. 52.
1888. Fenestella subtortilis. Hall, Seventh Ann. Rep. State Geologist New York for the year 1887, pl. ix, 1-5.
Hamilton: Moscow, New York.

Semicoscinium tenuiceps (Hall).

1852. Fenestella prisca (?) (not of Lonsdale nor of Goldfuss). Hall, Pal. New York, II, p. 50, pl. xix, 4*a*-*m*.
1852. Fenestella tenuiceps. Hall, Pal. New York, II, p. 165, pl. xlD, 2*a*-*b*.
1890. Semicoscinium tenuiceps. Ulrich, Geol. Surv. Illinois, VIII, p. 355.
Niagara: Lockport, New York.

Semicoscinium thyene (Hall).

1879. Fenestella Thyene. Hall, Thirty-second Ann. Rep. New York State Mus., p. 170 (reprint, 1880, p. 32).
1883. Fenestella Thyene. Hall, Rep. State Geologist New York for the year 1882, pl. xxi, 1-5.

Semicoscinium thyene (Hall)—Continued.

1887. Fenestella Thyene. Hall and Simpson, Pal. New York, VI, p. 50, pl. xxi, 1-5.

1890. Semicoscinium thyene. Ulrich, Geol. Surv. Illinois, VIII, p. 534.

Lower Helderberg: Clarksville, New York.

Semicoscinium tortum (Hall).

1883. Fenestella torta. Hall, Trans. Albany Institute, X, p. 172 (abstract, 1881, p. 30).

Hamilton: Falls of the Ohio.

Semicoscinium tuberculatum Prout.

1859. Semicoscinium tuberculatum. Prout, Trans. St. Louis Acad. Sci., I, p. 579.

Hamilton: Falls of the Ohio.

SEMIOPORA Hall. Genotype: Semiopora bistigmata Hall.

1883. Semiopora. Hall, Trans. Albany Institute, X, p. 193 (abstract, 1881, p. 193).

1884. Semiopora. Hall, Rep. State Geologist New York for the year 1883, p. 51.

1887. Semiopora. Hall and Simpson, Pal. New York, VI, p. xxii.

1889. Semiopora. Miller, North American Geol. Pal., p. 322.

1897. Semiopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 535.

Semiopora bistigmata Hall.

1883. Semiopora bistigmata. Hall, Trans. Albany Institute, X, p. 193 (abstract, 1881, p. 193).

1884. Semiopora bistigmata. Hall, Rep. State Geologist New York for the year 1883, p. 51.

1887. Semiopora bistigmata. Hall and Simpson, Pal. New York, VI, p. 262, pl. xlii, 27-29.

1891. Semiopora bistigmata. Hall, Tenth Ann. Rep. State Geologist New York for the year 1890, p. 52; Forty-fourth Ann. Rep. New York State Mus., p. 82.

1897. Semiopora bistigmata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xi, 10, 11.

1898. Semiopora bistigmata. Whiteaves, Contr. Canadian Pal., I, Part V, p. 377.

Hamilton: West Williams, Ontario.

SEPTOPORA Prout. Genotype: Septopora Cestriensis Prout.

1859. Septopora. Prout, Trans. St. Louis Acad. Sci., I, p. 448.

1882. Septopora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 150.

1885. Septopora. Waagen and Pichl., Pal. Indica, Ser. XIII, p. 773.

1886. Septopora. Ulrich, Contr. American Pal., I, p. 6.

1887. Septopora. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 79.

1889. Septopora. Miller, North American Geol. Pal., p. 322.

1890. Septopora. Ulrich, Geol. Surv. Illinois, VIII, pp. 397, 626.

1895. Septopora. Simpson, Thirteenth Ann. Rep. State Geologist New York for the year 1893, pp. 721, 726; Forty-seventh Ann. Rep. New York State Mus., pp. 915, 920.

1895. Septopora. Whidborne, Devon. Fauna England (Pal. Soc. Publ.), II, part 4, p. 183.

1896. Septopora. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 283.

1897. Septopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pp. 514, 521.

Septopora biserialis (Swallow).

1858. Synocladia virgulacea Phillips (?). Swallow, Trans. St. Louis Acad. Sci., I, p. 179.
1858. Synocladia biserialis. Swallow, Trans. St. Louis Acad. Sci., I, p. 179.
1860. Synocladia biserialis. Meek and Hayden, Proc. Acad. Nat. Sci. Philadelphia, p. 24.
1866. Synocladia virgulacea (not of Phillips). Geinitz, Carb. und Dyas in Nebraska, p. 70, pl. v, 14.
1870. Synocladia virgulacea var. biserialis. Meek and Worthen, Geol. Surv. Illinois, V, pl. xxiv, 15*a–c*.
1872. Synocladia biserialis. Meek, Pal. Eastern Nebraska, p. 156, pl. vii, 5*a–e*.
1874. Synocladia biserialis. Meek, American Jour. Sci. Arts., ser. 3, VII, p. 486.
1877. Synocladia biserialis. White, Wheeler's United States Geol. Surv., IV, p. 107, pl. vii, 3*a–c*.
1884. Synocladia biserialis. White, Thirteenth Ann. Rep. Indiana Geol. Nat. Hist., Part 2, p. 138, pl. xxv, 11–13.
1887. Septopora biserialis. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 87; ibid., III, 1888, pl. vii, 16*a–c*.
1888. Synocladia biserialis. Keyes, Proc. Acad. Nat. Sci. Philadelphia, p. 225.
1890. Septopora biserialis. Ulrich, Geol. Surv. Illinois, VIII, p. 631, pl. lvi, 11.
1894. Septopora biserialis. Keyes, Missouri Geol. Surv., V, p. 32, pl. xxxiv, 1*a–d*.
1896. Septopora biserialis. Smith, Proc. American Phil. Soc., XXXV, p. 237.
Coal Measures: Various localities in Kansas, Nebraska, Missouri, Indian Territory, Iowa, Illinois, Ohio, and Kentucky.

Septopora biserialis-gracilis (Meek).

1875. Synocladia biserialis var. gracilis. Meek, Pal. Ohio, II, p. 326, pl. xx, 5–5*b*.
1887. Septopora biserialis var. gracilis. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 80; ibid., III, 1888, pl. vii, 7*a–c*.
Coal Measures: Flint Ridge, Ohio.

Septopora biserialis-nervata Ulrich.

1890. Septopora biserialis var. nervata. Ulrich, Geol. Surv. Illinois, VIII, p. 632, pl. lxiv, 6.
Chester: Kentucky.
Coal Measures: Illinois and near Red Oak, Iowa.

Septopora cestriensis Meek and Worthen (not Prout). See Septopora subquadrans Ulrich.

Septopora cestriensis Prout.

1859. Septopora Cestriensis. Prout, Trans. St. Louis Acad. Sci., I, p. 448, pl. xviii, 2–2*b*.
1890. Septopora cestriensis. Ulrich, Geol. Surv. Illinois, VIII, p. 628, pl. lxiv, 1–1*b*.
1894. Septopora cestriensis. Keyes, Missouri Geol. Surv., V, p. 32.
1897. Septopora cestriensis. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 65 (p. 515).
Chester: Chester, Illinois; Sloans Valley and several localities in western Kentucky.

Septopora decipiens Ulrich.

1890. Septopora decipiens. Ulrich, Geol. Sur. Illinois, VIII, p. 630, pl. lxvi, 9.
Chester: Sloans Valley, Kentucky.

Septopora delicatula Ulrich.

1890. Septopora delicatula. Ulrich, Geol. Surv. Illinois, VIII, p. 634, pl. lxiv, 5, *5a*.

Lower Coal Measures: Seville, Illinois.

Septopora pinnata Ulrich.

1890. Septopora pinnata. Ulrich, Geol. Surv. Illinois, VIII, p. 633, pl. lxiv, 7, pl. lxv, 1, *1a*.

Upper Coal Measures: Jasper County, Illinois.

Septopora rectistyla (Whitfield).

1882. Synocladia rectistyla. Whitfield, Annals New York Acad. Sci., II, p. 220.
1891. Septopora rectistyla. Whitfield, Annals New York Acad. Sci., V, p. 579, pl. xiii, 9, 10.
1895. Synocladia rectistyla. Whitfield, Geol. Sur. Ohio, VII, p. 467, pl. ix, 9, 10.

Chester: Newtonville, Ohio.

Septopora robusta Ulrich.

1890. Septopora robusta. Ulrich, Geol. Sur. Illinois, VIII, p. 633, pl. lvi, 9–*9c*, pl. lxiv, 3, *3a*.

Upper Coal Measures: Fayette County, Illinois.

Septopora robusta-intermedia Ulrich.

1890. Septopora robusta var. intermedia. Ulrich, Geol. Sur. Illinois, VIII, p. 634, pl. lvi, 10, pl. lxiv, 4, *4a*.

Chester: Litchfield and Sloans Valley, Kentucky.

Septopora subquadrans Ulrich.

1870. Septopora cestriensis (not of Prout). Meek and Worthen, Proc. Acad. Nat. Sci. Philadelphia, p. 15.
1870. Septopora cestriensis (not of Prout). Meek and Worthen, Geol. Sur. Illinois, V, pl. xxiv, 14 *a–c*.
1874. Septopora cestriensis (not of Prout). Meek, American Jour. Sci. Arts, ser. 3, VII, p. 486.
1890. Septopora subquadrans. Ulrich, Geol. Sur. Illinois, VIII, p. 629, pl. lvi, 7, 8, pl. lxiv, 2–*2b*.

Chester: Chester, Illinois; Sloans Valley, and other localities in Kentucky.

SPATIOPORA Ulrich. Genotype: Spatiopora aspera Ulrich.

1882. Spatiopora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 155; ibid, VI, 1883, p. 166.
1883. Spatiopora. Foord, Contr. Micro-Pal. Cambro-Sil., p. 20.
1889. Spatiopora. Miller, North American Geol. Pal., p. 323.
1890. Spatiopora. Ulrich, Geol. Sur. Illinois, VIII, p. 381.
1893. Spatiopora. Ulrich, Geol. Minnesota, III, p. 319.
1896. Spatiopora. Ulrich, Zittel's Textb. Pal. (Eng. ed.), p. 269.

Spatiopora ? areolata Foord.

1883. Spatiopora areolata. Foord, Contr. Micro-Pal. Cambro-Sil., p. 21, pl. v, 1–*1i*.

Trenton: Hull, Quebec.

Spatiopora aspera Ulrich.

1883. Spatiopora aspera. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 166, pl. vii, 5–*5b*.
1895. Monticulipora aspera. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVIII, p. 82.
1896. Spatiopora aspera. Ulrich, Zittel's Textb. Pal. (Eng. ed.), fig. 441 (p. 269).

Cincinnati (Lorraine): Hamilton and Cincinnati, Ohio.

Spatiopora corticans (Nicholson).

1874. Chætetes corticans. Nicholson, Quar. Jour. Geol. Soc. London, XXX, p. 512, pl. xix, 13, 14.

1875. Chætetes corticans. Nicholson, Pal. Ohio, II, p. 210, pl. xxii, 6, 6*a*.

1876. Chætetes tuberculatus (not of Milne-Edwards and Haime). Nicholson, Ann. Mag. Nat. Hist., ser. 4, XVIII, p. 91.

1881. Monticulipora (Monotrypa) tuberculata (not of Milne-Edwards and Haime). Nicholson, Genus Monticulipora, p. 200, pl. iv, 2–2*d*.

Cincinnati (Lorraine and Richmond): Cincinnati, Warren, and Clinton counties, Ohio; Richmond and Versailles, Indiana.

Obs. This species has been considered synonymous with Spatiopora tuberculata (Milne-Edwards and Haime), but investigations show that it can be distinguished by several important and reliable characters.

Spatiopora iowensis Ulrich.

1893. Spatiopora iowensis. Ulrich, Geol. Minnesota, III, p. 321.

Cincinnati (Utica): Graf and Lantnerville, Iowa.

Spatiopora labeculosa Ulrich.

1893. Spatiopora labeculosa. Ulrich, Geol. Minnesota, III, p. 320, pl. xxviii, 1, 2.

Trenton (Black River): Minneapolis, St. Paul, and Fountain, Minnesota.

Spatiopora lineata Ulrich.

1883. Spatiopora lineata. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 167, pl. vii, 7.

Cincinnati (Lorraine): Hamilton and Cincinnati, Ohio.

Spatiopora lineata-incepta Ulrich.

1893. Spatiopora maculosa var. incepta. Ulrich, Geol. Minnesota, III, p. 320.

Trenton (Black River): Chatfield, Minnesota.

Spatiopora maculosa Ulrich.

1883. Spatiopora maculosa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 167, pl. vii, 6.

Cincinnati (Lorraine): Cincinnati, Ohio, and vicinity.

Spatiopora maculosa var. incepta Ulrich. See Spatiopora lineata-incepta Ulrich.

Spatiopora montifera Ulrich.

1883. Spatiopora montifera. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 168, pl. vi, 1, 1*a*, pl. vii, 8.

Cincinnati (Richmond): Waynesville, Clarksville, and Oxford, Ohio.

Spatiopora tuberculata (Milne-Edwards and Haime).

1851. Chætetes tuberculatus. Milne-Edwards and Haime, Pol. Foss. Terr. Pal., p. 268, pl. xix, 3, 3*a*.

1883. Monticulipora tuberculata. Hall, Twelfth Ann. Rep. Indiana Geol. Nat. Hist., p. 251, pl. x, 6.

1883. Spatiopora tuberculata. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 166.

1888. Monticulipora tuberculata. James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 21.

1895. Monticulipora tuberculata. J. F. James, Jour. Cincinnati Soc. Nat. Hist., XVI, p. 78.

Cincinnati (Lorraine and Richmond): Cincinnati, Waynesville, and other localities in Ohio.

SPHRAGIOPORA Ulrich. Genotype: Sphragiopora parasitica Ulrich.

1890. Sphragiopora. Ulrich, Geol. Surv. Illinois, VIII, pp. 398, 638.
1889. Sphragiopora. (Ulrich, in press), Miller, North American Geol. Pal., p. 323.
1897. Sphragiopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 594.

Sphragiopora parasitica Ulrich.

1890. Sphragiopora parasitica. Ulrich, Geol. Sur. Illinois, VIII, p. 638, pl. lxv, 6, 6*a*.
1894. Sphragiopora parasitica. Keyes, Missouri Geol. Sur., V, p. 33.
1897. Sphragiopora parasitica. Simpson, Fourteenth Ann. Rep. State Geologist New York, for the year 1894, fig. 196 (p. 594).
Chester: Chester, Illinois.

Stellipora Milne-Edwards and Dybowski (not Hall). See Constellaria Dana.

STELLIPORA Hall. Genotype: Stellipora antheloidea Hall.

1847. Stellipora. Hall, Pal. New York, I, p. 79.
1850. Stellipora. D'Orbigny, Prodr. de Pal., I, p. 22.
1877. Stellipora (in part). Dybowski, Die Chætetiden d. Ostbaltischen Silur-Form., p. 42.
1882. Stellipora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 155; ibid., VI, 1883, p. 263.
1889. Stellipora (in part). Miller, North American Geol. Pal., p. 203.
1890. Stellipora. Ulrich, Geol. Surv. Illinois, VIII, p. 374.
1896. Stellipora. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 276.

Stellipora antheloidea Hall.

1847. Stellipora antheloidea. Hall, Pal. New York, I, p. 79, pl. xxvi, 10*a*–*c*.
1883. Stellipora antheloidea. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 263, pl. xiv, 1, 1*a*.
1888. Monticulipora (Constellaria) antheloidea (in part). James and James, Jour. Cincinnati Soc. Nat. Hist., XI, p. 31.
Trenton: Lowville, New York; Ottawa, Canada.

Stellipora antheloidea D'Orbigny (not Hall). See Constellaria constellata (Van Cleve) Dana.

Stellipora (Constellaria) antheloidea Rominger. See Constellaria constellata (Van Cleve) Dana.

Stellipora limitaris Ulrich. See Constellaria limitaris (Ulrich).

STENOPORA Lonsdale. Genotype: Stenopora tasmaniensis Lonsdale.

1844. Stenopora. Lonsdale, Darwin's Volcanic Islands, Appendix, p. 161.
1845. Stenopora. Lonsdale, Strzelecki's Physical Description New South Wales, p. 262.
1845. Stenopora. Lonsdale, Geol. Russia and Ural Mountains, I, p. 631.
1850. Stenopora. King, Monograph Perm. Foss. England, p. 28.
1852. Stenopora. McCoy, Brit. Pal. Foss., p. 24.
1860. Stenopora. Eichwald, Lethæa Rossica, I, p. 414.
1874. Stenopora. Miller, Cincinnati Quar. Jour. Sci., I, p. 368.
1876. Stenopora. Dybowski, Verh. d. k. Min. Ges. St. Petersburg, ser. 2, X, p. 180.
1879. Stenopora. Nicholson and Etheridge, Jun., Ann. Mag. Nat. Hist., ser. 5, IV, p. 265.
1879. Stenopora. Nicholson, Pal. Tabulate Corals, p. 168.
1882. Stenopora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 154.

STENOPORA Lonsdale—Continued.

1886. Stenopora. Nicholson and Etheridge, Jun., Ann. Mag. Nat. Hist., ser. 5, XVII, pp. 173-187.
1886. Stenopora. Waagen and Wentzel, Pal. Indica, Ser. XIII, pp. 875, 885.
1887. Stenopora. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 85.
1889. Stenopora. Miller, North American Geol. Pal., p. 203.
1890. Stenopora. Ulrich, Geol. Surv. Illinois, VIII, pp. 375, 436.
1896. Stenopora. Zittel's Textb. Pal. (Engl. Ed.), p. 105.
1896. Stenopora. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 277.
1897. Stenopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 583.
1883. Tabulipora. Young, Ann. Mag. Nat. Hist., ser. 5, XII, p. 154.
1844. Tubuliclidia. Lonsdale, Bull. Soc. Geol. France, ser. 2, I, p. 497.
1845. Tubuliclidia. Lonsdale, Murchison's Geol. Russia, pp. 221, 631.

Stenopora adherens Billings. Not recognizable.

1859. Stenopora adherens. Billings, Canadian Nat. Geol., IV, p. 427.
Chazy: Mingan Islands, Canada.

Stenopora americana Ulrich.

1890. Stenopora americana. Ulrich, Geol. Surv. Illinois, VIII, p. 437, pl. lxxiv, 1, 1*a*, fig. 4*b* (p. 309).
1894. Stenopora americana. Keyes, Missouri Geol. Surv., V, p. 14.
1896. Stenopora americana. Ulrich, Zittel's Textb. Pal. (Engl. ed.), fig. 464, (p. 277).
Keokuk: Warsaw, and Jersey County, Illinois.

Stenopora americana-varsoviensis Ulrich.

1890. Stenopora americana var. varsoviensis. Ulrich, Geol. Surv. Illinois, VIII, p. 437, pl. lxxiv, 3, 3*a*.
Warsaw: Warsaw, Illinois.

Stenopora angularis Ulrich.

1890. Stenopora angularis. Ulrich, Geol. Surv. Illinois, VIII, p. 439, pl. lxxiv, 6-6*b*.
1894. Stenopora angularis. Keyes, Missouri Geol. Surv., V, p. 15.
Keokuk: Lagrange, Missouri.

Stenopora bulbosa Billings. Not recognizable.

1865. Stenopora bulbosa. Billings, Canadian Nat. Geol., ser. 2, II, p. 429.
1866. Stenopora bulbosa. Billings, Catal. Sil. Foss. Anticosti, p. 32.
Anticosti: Anticosti Island.

Stenopora carbonaria (Worthen).

1875. Chætetes ? carbonaria. Worthen, Geol. Surv. Illinois, VI, p. 526, pl. xxxii, 5.
1887. Stenopora carbonaria. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 85; ibid., III, 1888, pl. viii, 13*a-c*.
1890. Stenopora carbonaria. Ulrich, Geol. Surv. Illinois, VIII, p. 445, pl. lxxiii, 8, 8*a*.
Coal Measures: Caseyville and Peoria, Illinois; Lawrence, Kansas; Licking County, Ohio.

Stenopora carbonaria-conferta Ulrich.

1890. Stenopora carbonaria var. conferta. Ulrich, Geol. Surv. Illinois, VIII, p. 446, pl. lxxiii, 9, 9*a*.
Coal Measures: Caseyville, Illinois.

Stenopora carbonaria-maculosa Ulrich.
1890. Stenopora carbonaria var. maculosa. Ulrich, Geol. Surv. Illinois, VIII, p. 445, pl. lxxiii, 10, 10*a*.
Coal Measures: Caseyville, Illinois.

Stenopora cestriensis Ulrich.
1890. Stenopora cestriensis. Ulrich, Geol. Surv. Illinois, VIII, p. 442, pl. lxxiv, 7, 7*a*.
1894. Stenopora cestriensis. Keyes, Missouri Geol. Surv., V, p. 16.
Chester: Chester, Illinois; Smithland, Sloans Valley, and Caldwell County, Kentucky.

Stenopora emaciata Ulrich.
1890. Stenopora emaciata. Ulrich, Geol. Surv. Illinois, VIII, p. 438, pl. lxxiv, 2, 2*a*.
1894. Stenopora emaciata. Keyes, Missouri Geol. Surv., V, p. 15.
Keokuk: Warsaw, Illinois; Keokuk, Iowa.

Stenopora exilis Dawson. See Rhombopora exilis (Dawson).

Stenopora fibrosa Billings (not Goldfuss?).
1863. Stenopora fibrosa. Billings, Geol. Canada, p. 156, fig. 116.
1866. Stenopora fibrosa. Billings, Catal. Sil. Foss. Anticosti, p. 32.
Trenton: Canada.
Obs. A. H. Foord (Contr. Micro-Pal. Cambro-Sil., p. 15) says this is probably Monotrypella (now Eridotrypa) trentonensis (Nicholson).

Stenopora huronensis Billings. Not a bryozoan.
1865. Stenopora huronensis. Billings, Pal. Foss., I, p. 185.
Obs. This is a species of Tetradium according to A. H. Foord.

Stenopora intercalaris Ulrich.
1890. Stenopora intercalaris. Ulrich, Geol. Surv. Illinois, VIII, p. 439, pl. lxxiv, 5, 5*a*.
1894. Stenopora intercalaris. Keyes, Missouri Geol. Surv., V, p. 15.
1897. Stenopora intercalaris. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 160, 161 (p. 584).
Keokuk: Warsaw, Illinois.

Stenopora intermittens Ulrich.
1890. Stenopora intermittens. Ulrich, Geol. Surv. Illinois, VIII, p. 440, fig. 16.
1894. Stenopora intermittens. Keyes, Missouri Geol. Surv., V, p. 15.
Keokuk: Warsaw, Illinois.

Stenopora libana Safford. Not recognized.
1869. Stenopora libana. Safford, Geol. Tennessee, p. 285.

Stenopora meekana Ulrich.
1890. Stenopora meekana. Ulrich, Geol. Surv. Illinois, VIII, p. 443, pl. lxxiii, 7, 7*a*.
1894. Stenopora meekana. Keyes, Missouri Geol. Surv., V, p. 16.
Chester: Chester, Illinois; Sloans Valley, Kentucky.

Stenopora montifera Ulrich.
1890. Stenopora montifera. Ulrich, Geol. Surv. Illinois, VIII, p. 438, pl. lxxiv, 4–4*b*.
1894. Stenopora montifera. Keyes, Missouri Geol. Surv., V, p. 14.
Keokuk: Otter Creek, Jersey County, Illinois; Bentonsport, Iowa.

Stenopora ohioensis Foerste.

1887. Stenopora ohioensis. Foerste, Bull. Sci. Lab. Denison Univ., II, p. 85; ibid., III, 1888, pl. viii, 12*a–e*.

Coal Measures: Flint Ridge, Ohio.

Stenopora patula Billings. Not recognizable.

1859. Stenopora patula. Billings, Canadian Nat. Geol., IV, p. 427

Chazy: Island of Montreal and Mingan Islands, Canada.

Stenopora ramosa Ulrich.

1890. Stenopora ramosa. Ulrich, Geol. Surv. Illinois, VIII, p. 442, pl. lxxiii, 6–6*c*.

Chester: Sloans Valley and Grayson Springs, Kentucky; Chester, Illinois.

Stenopora rudis Ulrich.

1890. Stenopora rudis. Ulrich, Geol. Surv. Illinois, VIII, p. 444, pl. lxxii, 8–8*b*.

Chester: Sloans Valley, Kentucky.

Stenopora ? signata Ulrich.

1890. Stenopora ? signata. Ulrich, Geol. Surv. Illinois, VIII, p. 446, pl. lxxiii, 5–5*b*.

Coal Measures: Caseyville, Illinois.

Stenopora tuberculata (Prout).

1859. Flustra tuberculata. Prout, Trans. St. Louis Acad. Sci., I, p. 447, pl. xvii, 3–3*f*.

1890. Stenopora tuberculata. Ulrich, Geol. Surv. Illinois, VIII, p. 441, fig. 17, fig. 5*c* (p. 315).

1894. Stenopora tuberculata. Keyes, Missouri Geol. Surv., V, p. 15.

1860. Cyclopora polymorpha. Prout, Trans. St. Louis Acad. Sci., I, p. 578.

1866. Cyclopora polymorpha. Prout, Geol. Surv. Illinois, II, p. 421, pl. xxi, 5–5*b*.

Warsaw: Barretts Station, Missouri (Prout), and elsewhere.

St. Louis: Several localities.

Chester: Pope County (Prout) and Chester, Illinois; Grayson Springs and Sloans Valley, Kentucky, and many other localities.

Stictocella Simpson. See Cystodictya Ulrich.

Stictocella interstriata Simpson. See Stictopora ?? interstriata Hall.

Stictocella sinuosa Simpson. See Cystodictya sinuosa (Hall).

STICTOPORA Hall. Genotype: Stictopora elegantula Hall.

1847. Stictopora. Hall, Pal. New York, I, p. 73.

1879. Stictopora (in part). Hall, Twenty-eighth Ann. Rep. New York State Mus., p. 122.

1882. Stictopora (in part). Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 247.

1889. Stictopora (in part). Miller, North American Geol. Pal., p. 323.

1897. Stictopora (in part). Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 605.

Not Stictopora. Eichwald, Lethæa Rossica, I, p. 390.

Not Stictopora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, 1882, pp. 152, 168 (=Rhinidictya).

Not Stictopora. Hall and Simpson, Pal. New York, VI, 1887, p. xx (=Cystodictya).

Not Stictopora. Ulrich, Geol. Surv. Illinois, VIII, 1890, p. 388 (=Rhinidictya).

STICTOPORA Hall—Continued.

1897. Not Stictopora. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, 1899, p. 172 (=Cystodictya).

Obs. This name has been applied to a number of unrelated forms. A description and figures of the internal structure of the genotype have never been published. Thin sections of S. elegantula show that the genus is related to both Stictoporella and Tæniodictya. It resembles the former in the long primitive portion of the zooecial tubes, but is distinguished by the well-marked peristomes and absence of mesopores. From the latter it differs in the absence of hemisepta, the presence of peristomes, and the long primitive portion of the zooecial tubes.

Stictopora? acuta Hall. See Pachydictya acuta (Hall).

Stictopora acuta Ulrich. See Pachydictya acuta (Hall).

Stictopora alternata Hall and Simpson. Not recognizable.

1887. Stictopora alternata. Hall and Simpson, Pal. New York, VI, pl. xxiii A, 21. (Not described.)

Lower Helderberg: Clarksville, New York.

Stictopora angularis Hall. See Cystodictya tumulosa (Hall).

Stictopora basalis Ulrich. See Rhinidictya basalis (Ulrich).

Stictopora bifurcata Hall. See Cystodictya bifurcata (Hall).

Stictopora bifurcata (Van Cleve) Hall. See Pachydictya bifurcata (Hall).

Stictopora bristolensis Miller. See Cystodictya bifurcata (Hall).

Obs. The name bristolensis was proposed by S. A. Miller (North American Geol. Pal., p. 323) for Stictopora bifurcata Hall, which he considered preoccupied.

Stictopora clathratula James. See Escharopora pavonia (D'Orbigny).

Stictopora (Stictoporina) claviformis Hall and Simpson. See Stictoporina claviformis (Hall).

Stictopora compressa (Van Cleve) Hall. See Phænopora magna Hall and Whitfield.

Stictopora crassa Hall. See Pachydictya crassa (Hall).

Stictopora crenulata Hall. See Cystodictya subrigida (Hall).

Stictopora crescens Hall. See Cystodictya crescens (Hall).

Stictopora crispata Quenstedt. See Cystodictya gilberti (Meek).

Stictopora dichotoma Hall. See Tæniopora subcarinata (Hall).

Stictopora ?? divergens Hall and Simpson.

1887. Stictopora divergens. Hall and Simpson, Pal. New York, VI, p. 257, pl. lxiii, 18, 19.

1891. Stictopora divergens. Hall. Tenth Ann. Rep. State Geologist New York for the year 1890, p. 49; Forty-fourth Ann. Rep. New York State Mus., p. 79.

Hamilton: Darien Center, New York.

Stictopora elegantula Hall.

1847. Stictopora elegantula. Hall, Pal. New York, I, p. 75, pl. xxvi, 4*a*–*g*.

Trenton: Middleville, Trenton Falls, and other localities in New York.

Obs. See remarks under Stictopora.

Stictopora fenestrata Hall. See Rhinidictya fenestrata (Hall).

Stictopora fidelis Ulrich. See Rhinidictya fidelis (Ulrich).

Stictopora fidelis Ulrich, 1886 (in part). See Rhinidictya trentonensis (Ulrich).

Stictopora fragilis Whitfield. See Dicranopora fragilis (Billings).

Stictopora ?? fruticosa Hall.

1883. Stictopora fruticosa. Hall, Trans. Albany Institute, X, p. 56 (abstract, 1881, p. 14).
1883. Stictopora fruticosa. Hall, Rep. State Geologist New York for the year 1882, pl. xxv, 12-14.
1887. Stictopora fruticosa. Hall and Simpson, Pal. New York, VI, p. 92, pl. xxviii, 12-14.
Upper Helderberg: New York.

Stictopora Gilberti Hall. See Cystodictya gilberti (Meek).

Stictopora ? glomerata Hall.

1847. Stictopora glomerata. Hall, Pal. New York, I, p. 17, pl. iv, 5.
Chazy: Granville, Vermont.

Stictopora graminifolia Ringueberg. Recognizable ?

1884. Stictopora graminifolia. Ringueberg, Proc. Acad. Nat. Sci. Philadelphia, p. 147, pl. iii, 4.
Niagara (Transitional): Gasport, New York.

Stictopora ?? granatula Hall.

1883. Trematopora rhombifera (in part). Hall, Rep. State Geologist New York for the year 1882, pl. xi, 16.
1887. Stictopora granatula. Hall and Simpson, Pal. New York, VI, p. 38, pl. xi, 16; pl. xxiii A, 17.
Lower Helderberg: Catskill Creek and Clarksville, New York.

Stictopora ?? granifera Hall.

1883. Stictopora granifera. Hall. Trans. Albany Institute, X, p. 191 (abstract, 1881, p. 191).
1884. Stictopora granifera. Hall, Rep. State Geologist New York for the year 1883, p. 45.
1887. Stictopora granifera. Hall and Simpson, Pal. New York, VI, p. 257, pl. lxi, 1-6.
1891. Stictopora granifera. Hall, Tenth Ann. Rep. State Geologist New York for the year 1890, p. 49; Forty-fourth Ann. Rep. New York State Mus., p. 79.
Hamilton: Pavilion and Muttonville, New York.

Stictopora incisurata Hall. See Cystodictya incisurata (Hall).

Stictopora ?? incrassata Hall.

1883. Stictopora incrassata. Hall, Trans. Albany Institute, X, p. 190 (abstract, 1881, p. 190).
1884. Stictopora incrassata. Hall, Rep. State Geologist New York for the year 1883, p. 47.
1887. Stictopora incrassata. Hall and Simpson, Pal. New York, VI, p. 249, pl. lxii, 1-6.
1891. Stictopora incrassata. Hall, Tenth Ann. Rep. State Geologist New York for the year 1890, p. 43; Forty-fourth Ann. Rep. New York State Mus., p. 73.
1898. Cystodictya ? incrassata. Whiteaves, Contr. Canadian Pal., I, p. 377.
Hamilton: West Williams, Ontario.

Stictopora indenta Hall. See Cystodictya incisurata (Hall).

Stictopora ?? interstriata Hall.

1883. Stictopora interstriata. Hall, Trans. Albany Institute, X, p. 191 (abstract, 1881, p. 191).
1884. Stictopora interstriata. Hall, Rep. State Geologist New York for the year 1883, p. 45.
1887. Stictopora interstriata. Hall and Simpson, Pal. New York, VI, p. 259, pl. lxii, 7-12.
1891. Stictopora interstriata. Hall, Tenth Ann. Rep. State Geologist New York for the year 1890, p. 51; Forty-fourth Ann. Rep. New York State Mus., p. 81.
1897. Stictocella interstriata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. x, 6, 7. [Note: Figure 6 is given in Pal. New York, VI, pl. lxi, 2, as Stictopora granifera.]

Hamilton: Fallbrook, New York.

Stictopora invertis Hall. See Cystodictya ? invertis (Hall).

Stictopora ? labyrinthica Hall.

1847. Stictopora labyrinthica. Hall, Pal. New York, I, p. 50, pl. xii, 8*a*, *b*, and woodcut on p. 50.

Trenton (Stones River): Chazy and Watertown, New York.

Obs. This form may prove to be a Phyllodictya.

Stictopora limata Hall. See Cystodictya limata (Hall).

Stictopora linearis Hall. See Cystodictya linearis (Hall).

Stictopora lobata Hall. See Euspilopora lobata (Hall).

Stictopora magna Hall and Whitfield. See Phænopora magna (Hall and Whitfield).

Stictopora multifida (Van Cleve) Hall. See Phænopora multifida (Hall).

Stictopora multipora Hall. See Cystodictya incisurata (Hall).

Stictopora mutabilis Ulrich. See Rhinidictya mutabilis (Ulrich).

Stictopora mutabilis var. major Ulrich. See Rhinidictya mutabilis-major (Ulrich).

Stictopora mutabilis var. minor Ulrich. See Rhinidictya mutabilis (Ulrich).

Stictopora obliqua Hall. See Cystodictya incisurata (Hall).

Stictopora obliqua Ringueberg. See Ptilodictya obliqua (Ringueberg).

Stictopora ?? obsoleta Hall and Simpson.

1887. Stictopora obsoleta. Hall and Simpson, Pal. New York, VI, p. 37, pl. xxiiiA, 22.

Lower Helderberg: Clarksville, New York.

Obs. Probably a synonym for Stictopora ?? papillosa Hall.

Stictopora orbipora Hall. See Stictotrypa orbipora (Hall.)

Stictopora ovata Hall. See Cystodictya ovata (Hall).

Stictopora ovatipora Hall. See Cystodictya ? ovatipora (Hall).

Stictopora ovatipora Miller (not Hall). See Stictotrypa similis (Hall).

Stictopora palmipes Hall. See Euspilopora palmipes (Hall).

Stictopora ?? papillosa Hall.

1879. Stictopora papillosa. Hall, Thirty-second Ann. Rep. New York State Mus., p. 161 (reprint, 1880, p. 23).
1883. Stictopora papillosa. Hall, Rep. State Geologist New York for the year 1882, pl. xiii, 12, 13.

Stictopora ?? papillosa Hall—Continued.

1887. Stictopora papillosa. Hall and Simpson, Pal. New York, VI, p. 37, pl. xiii, 12, 13, pl. xxiiiA, 16.
Lower Helderberg: Clarksville, New York.

Stictopora paupera Ulrich. See Rhinidictya paupera (Ulrich) and Rhinidictya neglecta (Ulrich).

Stictopora perarcta Hall. See Cystodictya perarcta (Hall).

Stictopora ?? permarginata Hall.

1883. Stictopora permarginata. Hall, Trans. Albany Institute, X, p. 191 (abstract, 1881, p. 191).
1884. Stictopora permarginata. Hall, Rep. State Geologist New York for the year 1883, p. 46.
1887. Stictopora permarginata. Hall and Simpson, Pal. New York, VI, p. 258, pl. lxiii, 16.
1891. Stictopora permarginata. Hall, Tenth Ann. Rep. State Geologist New York for the year 1890, p. 50; Forty-fourth Ann. Rep. New York State Mus., p. 80.
1899. Stictopora permarginata. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 174, fig. 70.
Hamilton: Hamburg, New York.

Stictopora punctipora Hall. See Stictotrypa punctipora (Hall).

Stictopora ? ramosa Hall.

1847. Stictopora ramosa. Hall, Pal. New York, I, p. 51, pl. xii, 6, 7, 7*a*, and woodcut on p. 51.
Trenton (Stones River): ? Watertown, New York.

Stictopora raripora Hall. See Nematopora raripora (Hall).

Stictopora recta Hall. See Cystodictya ? recta Hall.

Stictopora rectalinea Hall. See Cystodictya rectilinea (Hall.)

Stictopora rectilatera Hall. See Cystodictya linearis (Hall).

Stictopora recubans Hall and Simpson. See Tæniopora recubans (Hall and Simpson).

Stictopora rhomboidea Hall. See Tæniodictya ? rhomboidea (Hall).

Stictopora rigida Hall. See Cystodictya rigida (Hall).

Stictopora scitula Hall and Simpson. See Pachydictya crassa (Hall).

Stictopora ? scutulata Hall. See Stictoporina scutulata (Hall).

Stictopora semistriata Hall. See Cystodictya semistriata (Hall).

Stictopora similis Hall. See Stictotrypa similis (Hall).

Stictopora sinuosa Hall. See Cystodictya sinuosa (Hall).

Stictopora ?? striata Hall and Simpson.

1887. Stictopora striata. Hall and Simpson, Pal. New York, VI, p. 246, pl. lxiii, 22.
1888. Stictopora striata. Herrick, Bull. Sci. Lab. Denison Univ., III, pl. xii, 40, 40*a*.
1891. Stictopora striata. Hall, Tenth Ann. Rep. State Geologist New York for the year 1890, p. 42; Forty-fourth Ann. Rep. New York State Mus., p. 72.
Hamilton: Ontario County, New York. A form from the Waverly at Moots Run, Ohio, has been identified by Herrick as this species, but the identification is certainly incorrect.

Stictopora ? subcarinata Hall. See Tæniopora subcarinata (Hall).

Stictopora subrigida Hall. See **Cystodictya subrigida (Hall).**

Stictopora sulcata Winchell. See **Cystodictya sulcata (Winchell).**

Stictopora trilineata Hall. See **Cystodictya trilineata (Hall).**

Stictopora ? triserialis Hall. See **Acanthoclema triseriale (Hall).**

Stictopora tumulosa Hall. See **Cystodictya tumulosa (Hall).**

Stictopora Vanclevii Hall. See **Phænopora fimbriata (James).**

Stictopora vermicula Hall. See **Cystodictya vermicula (Hall).**

STICTOPORELLA Ulrich. Genotype: **Stictoporella interstincta** Ulrich =**Ptilodictya flexuosa** James.

1882. Stictoporella. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, pp. 152, 169.
1889. Stictoporella. Miller, North American Geol. Pal., p. 325.
1890. Stictoporella. Ulrich, Geol. Sur. Illinois, VIII, p. 394.
1893. Stictoporella. Ulrich, Geol. Minnesota, III, p. 179.
1896. Stictoporella. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 279.
1897. Stictoporella. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 535.

Stictoporella angularis Ulrich.

1886. Stictoporella angularis. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Sur. Minnesota, p. 71.
1893. Stictoporella angularis. Ulrich, Geol. Minnesota, III, p. 182, pl. xi, 1-3, 6, 8-11.

Trenton (Stones River): Minneapolis, St. Paul, Goodhue, and Fillmore counties, Minnesota.

Stictoporella angularis-intermedia Ulrich.

1893. Stictoporella angularis var. intermedia. Ulrich, Geol. Minnesota, III, p. 183, pl. xi, 4, 5, 7.

Trenton (Stones River): Minneapolis, Fountain, Lanesboro, and Preston, Minnesota; Decorah, Iowa.

Stictoporella basalis Ulrich. See **Intrapora basalis (Ulrich).**

Stictoporella cribrosa Ulrich.

1886. Stictoporella ? cribrosa. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Sur. Minnesota, p. 69.
1893. Stictoporella cribrosa. Ulrich, Geol. Minnesota, III, p. 184, pl. x, 21-25, pl. xi, 22, 23.
1897. Stictoporella cribrosa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 93 (p. 536).

Trenton (Stones River and Black River): Minneapolis and St. Paul, Minnesota.

Stictoporella dumosa Ulrich.

1893. Stictoporella dumosa. Ulrich, Geol. Minnesota, III, p. 181.

Trenton (Black River): St. Paul, Minnesota.

Stictoporella ? excellens Ulrich. See **Phænopora excellens (Billings).**

Stictoporella exigua Ulrich.

1893. Stictoporella exigua. Ulrich, Geol. Minnesota, III, pl. xiii, 18-21.

Trenton: Montreal, Canada.

Stictoporella flabellata (Hall).

1851. Clathropora flabellata. Hall, Foster and Whitney's Rep. Geol. Lake Superior Land District, Part II, p. 207, pl. xxiv, 2*a*, *b*.

Trenton: Escanaba River, below Indian Creek, Upper Peninsula, Michigan.

Stictoporella flexuosa (James).

1878. Ptilodictya flexuosa. James, Paleontologist, No. 1, p. 4.
1882. Stictoporella flexuosa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 169.
1882. Stictoporella interstincta. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 169, pl. viii, 9, 9*a*.
1889. Stictoporella interstincta. Miller, North American Geol. Pal., figs. 520, 521 (p. 325).
1890. Stictoporella interstincta. Ulrich, Geol. Surv. Illinois, VIII, fig. 14*a*, *b* (p. 394).
Cincinnati (Utica): Cincinnati, Ohio, and vicinity.

Stictoporella frondifera Ulrich.

1886. Stictoporella frondifera. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Surv. Minnesota, p. 72.
1893. Stictoporella frondifera. Ulrich, Geol. Minnesota, III, p. 183, pl. xi, 12–19.
Trenton (Stones River): Minneapolis, Minnesota.

Stictoporella interstincta Ulrich. See **Stictoporella flexuosa** (James).

Stictoporella rigida Ulrich.

1890. Stictoporella rigida. Ulrich, Jour. Cincinnati Soc. Nat. Hist., XII, p. 188, fig. 13.
1893. Stictoporella rigida. Ulrich, Geol. Minnesota, III, p. 180, pl. xi, 20, 21.
Trenton (Black River): Fountain, St. Paul, and Cannon Falls, Minnesota.

Stictoporella ? undulata Ulrich. See **Intrapora undulata** (Ulrich).

Stictoporidra Simpson. See **Tæniopora** Nicholson.

Stictoporina Simpson (in part). See **Tæniopora** Nicholson.

STICTOPORINA Hall and Simpson. Genotype: **Trematopora claviformis** Hall.

1887. Stictoporina. Hall and Simpson, Pal. New York, VI, p. xx.
1889. Stictoporina. Miller, North American Geol. Pal., p. 325.
1897. Stictoporina. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 543 (not p. 532, which is probably in error for Stictoporidra).

Stictoporina claviformis (Hall).

1883. Trematopora claviformis. Hall, Trans. Albany Institute, X, p. 181 (abstract 1881, p. 181).
1884. Trematopora claviformis. Hall, Rep. State Geologist New York for the year 1883, p. 12.
1887. Stictopora (Stictoporina) claviformis. Hall and Simpson, Pal. New York, VI, p. 269.
1897. Stictoporina claviformis. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. x, 1, 2.
Hamilton: Bellona, New York.

Stictoporina plumea (Hall and Simpson).

1887. Ptilodictya plumea. Hall and Simpson, Pal. New York, VI, p. 271, pl. lxi, 9–12.
1891. Ptilodictya plumea. Hall, Tenth Ann. Rep. State Geologist New York for the year 1890, p. 55; Forty-fourth Ann. Rep. New York State Mus., p. 85.
1897. Ptilodictya plumea. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xv, 4–6.
1899. Ptilodictya plumea. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 176, fig. 73.

Stictoporina plumea (Hall and Simpson)—Continued.

1887. Ptilodictya retiformis. Hall and Simpson, Pal. New York, VI, p. 272, pl. lxi, 13.

1897. Ptilodictya retiformis. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xv, 7.

Hamilton: Hamburg, New York.

Obs. See also note under Stictoporina scutulata (Hall).

Stictoporina scutulata (Hall).

1883. Stictopora ? scutulata. Hall, Trans. Albany Institute, X, p. 191 (abstract, 1881, p. 191).

1884. Stictopora ? scutulata. Hall, Rep. State Geologist New York for the year 1883, p. 47.

1887. Ptilodictya scutulata. Hall and Simpson, Pal. New York, VI, p. 272.

Hamilton: Canandaigua Lake, New York.

Obs. Probably a synonym for Stictoporina plumea (Hall and Simpson).

Stictoporina subcarinata Simpson. See **Tæniopora subcarinata** (Hall).

STICTOTRYPA Ulrich. Genotype: Stictopora similis Hall.

1890. Stictotrypa. Ulrich, Geol. Surv. Illinois, VIII, p. 393.

1896. Stictotrypa. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 279.

Stictotrypa orbipora (Hall).

1883. Stictopora orbipora. Hall, Trans. Albany Institute, X, p. 61 (abstract, 1879, p. 5).

1882. Stictopora orbipora. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 248.

Niagara: Waldron, Indiana

Stictotrypa punctipora (Hall).

1852. Stictopora punctipora. Hall, Pal. New York, II, p. 157, pl. xl B, *2a–c*.

1889. Stictopora punctipora. Miller, North American Geol. Pal., fig. 519 (p. 324).

1890. Stictotrypa punctipora. Ulrich, Geol. Surv. Illinois, VIII, fig. 13*a* (p. 394).

Niagara: Lockport, New York.

Stictotrypa similis (Hall).

1876. Stictopora similis. Hall, Twenty-eighth Ann. Rep. New York State Mus. (documentary edition), pl. xi, 13–16; ibid. (Museum edition, 1879), p. 122, pl. xi, 13–16.

1882. Stictopora similis. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 247, pl. x, 13–16.

1890. Stictotrypa similis. Ulrich, Geol. Surv. Illinois, VIII, fig. 13*b*, *c* (p. 394).

1889. Stictopora ovatipora (not of Hall). Miller, North American Geol. Pal., fig. 518 (p. 324).

Niagara: Waldron, Indiana.

Clinton: Belfast, Ohio (Foerste).

STOMATOPORA Bronn. Genotype: Alecto dichotoma Lamouroux.

Alecto, Lamouroux, 1821, Blainville, Johnston, Milne-Edwards, Busk, and others. (Not Alecto, Leach, 1814, a genus of Echinodermata.)

Aulopora (in part). Goldfuss, Reuss, Hall, Nicholson.

1825. Stomatopora. Bronn, Pflanzenth., p. 27.

1854. Stomatopora. D'Orbigny, Pal. Francais, Terr. Cret., V, p. 833.

1854. Stomatopora. Haime, Bry. Foss. Form. Juras., p. 159. [Extra ed., p. 3.]

1880. Stomatopora (in part). Hincks, British Marine Polyzoa, p. 424.

1882. Stomatopora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, p. 149.

1889. Stomatopora. Miller, North American Geol. Pal., p. 325.

STOMATOPORA Bronn—Continued.
1890. Stomatopora. Ulrich, Geol. Surv. Illinois, VIII, p. 367.
1893. Stomatopora. Ulrich, Geol. Minnesota, III, p. 115.
1896. Stomatopora. Ulrich, Zittel's Textb. Pal., (Eng. ed.), p. 260.
1897. Stomatopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 597.

Stomatopora ? alternata Hall and Whitfield. See Hederella alternata (Hall and Whitfield).

Stomatopora arachnoidea (Hall).
1847. Aulopora arachnoidea. Hall, Pal. New York, I, p. 76, pl. xxvi, 6*a*–*c*, and woodcut on p. 76.
1875. Aulopora arachnoidea. Nicholson, Pal. Ohio, II, p. 216, pl. xxiii, 1, 1*b*.
Trenton and Cincinnati (Utica, Lorraine, and Richmond): Various localities in New York, Ohio, Indiana, and Kentucky.

Stomatopora auloporoides Miller. See Proboscina auloporoides (Nicholson).

Stomatopora canadensis Whiteaves.
1897. Stomatopora Canadensis. Whiteaves, Pal. Foss., III, p. 161, pl. xviii, 4, 4*a*.
Trenton: Little Black Island, Lake Winnipeg, Canada.

Stomatopora confusa Miller. See Proboscina confusa (Nicholson).

Stomatopora delicatula (James).
1878. Hippothoa delicatula. James, Paleontologist, No. 1, p. 6.
1882. Stomatopora proutana. Miller, Jour. Cincinnati Soc. Nat. Hist., V, p. 39, pl. i, 4–4*b*.
1890. Stomatopora proutana. Ulrich, Jour. Cincinnati Soc. Nat. Hist., XII, fig. 2*c* (p. 175).
1893. Stomatopora proutana. Ulrich, Geol. Minnesota, III, p. 117, pl. i, 8–12.
1886. Rhopalonaria pertenuis. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Sur. Minnesota, p. 59.
Trenton (Stones River, Black River, and Trenton) and Cincinnati (Utica, Lorraine, and Richmond): Various localities in Ohio, Indiana, Kentucky, Tennessee, Illinois, Iowa, and Minnesota.

Stomatopora delicatula-tenuissima Ulrich.
1890. Stomatopora tenuissima. Ulrich, Jour. Cincinnati Soc. Nat. Hist., XII, p. 175, fig. 2.
1893. Stomatopora tenuissima. Ulrich, Geol. Minnesota, III, p. 116, pl. i, 6, 7.
1896. Stomatopora tenuissima. Ulrich, Zittel's Textb. Pal. (Eng. ed.), fig. 412A (p. 261).
Cincinnati (Utica): Cincinnati, Ohio, and vicinity.

Stomatopora frondosa Miller. See Proboscina frondosa (Nicholson).

Stomatopora (Proboscina) frondosa Ulrich. See Proboscina frondosa (Nicholson).

Stomatopora inflata (Hall).
1847. Alecto inflata. Hall, Pal. New York, I, p. 77, pl. xxvi, 7*a*, *b*.
1875. Hippothoa inflata. Nicholson, Pal. Ohio, II, p. 268, pl. xxv, 1–1*b*.
1881. Stomatopora inflata. Vine, Quar. Jour. Geol. Soc. London, XXXVII, p. 615.
1890. Stomatopora inflata. Ulrich, Jour. Cincinnati Soc. Nat. Hist., XII, p. 176, fig. 3*c*.

Stomatopora inflata (Hall)—Continued.

1893. Stomatopora inflata. Ulrich, Geol. Minnesota, III, p. 117, pl. i, 13–21.
1896. Stomatopora inflata. Ulrich, Zittel's Textb. Pal. (Eng. ed.), fig. 412B (p. 261).
1897. Stomatopora inflata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 202–204 (p. 597).

Trenton and Cincinnati: At various localities in the Black River of Minnesota; in the Trenton of New York, Kentucky, Minnesota, and Canada; in the Lorraine of Ohio, and in the Richmond of Ohio, Indiana, Kentucky, and Illinois.

Stomatopora ?? moniliformis Whiteaves.

1891. Stomatopora moniliformis. Whiteaves, Contr. Canadian Pal., I, p. 212, pl. xxviii, 10.

Devonian (Hamilton ?): Hay River, Canada.

Stomatopora parva Ringueberg.

1886. Stomatopora parva. Ringueberg, Bull. Buffalo Soc. Nat. Hist., V, p. 20, pl. ii, 16.

Niagara: Lockport, New York.

Stomatopora proutana Miller. See Stomatopora delicatula (James).

Stomatopora recta Ringueberg.

1886. Stomatopora recta. Ringueberg, Bull. Buffalo Soc. Nat. Sci., V, p. 20, pl. ii, 15, 15*a*.

Niagara: Lockport, New York.

Stomatopora tenuissima Ulrich. See Stomatopora delicatula-tenuissima Ulrich.

Stomatopora turgida Ulrich.

1890. Stomatopora turgida. Ulrich, Jour. Cincinnati Soc. Nat. Hist., XII, p. 176, fig. 3.
1893. Stomatopora turgida. Ulrich, Geol. Minnesota, III, p. 118, pl. i, 22, 23.

Cincinnati (Richmond): Wilmington, Illinois.

STREBLOTRYPA Ulrich. Genotype: Streblotrypa nicklesi Ulrich.

1890. Streblotrypa. Ulrich, Geol. Surv. Illinois, VIII, pp. 403, 665.
1889. Streblotrypa. (Ulrich, in press), Miller, North American Geol. Pal., p. 325.
1897. Streblotrypa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 551.
1899. Streblotrypa. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 167.
1887. Acanthoclema (in part). Hall and Simpson, Pal. New York, VI, p. xv.

Streblotrypa amplexa Ulrich.

1888. Streblotrypa amplexa. Ulrich, Bull. Denison Univ., IV, p. 86, pl. xiv, 13.

Waverly: Sciotoville, Ohio.

Streblotrypa (? Lioclema) denticulata Ulrich.

1888. Streblotrypa (? Lioclema) denticulata. Ulrich, Bull. Denison Univ., IV, p. 88, pl. xiv, 18, 19.

Waverly: Richfield and Lodi, Ohio.

Streblotrypa distincta Ulrich.

1890. Streblotrypa distincta. Ulrich, Geol. Surv. Illinois, VIII, p. 669, pl. lxxi, 10–10*b*.
1894. Streblotrypa distincta. Keyes, Missouri Geol. Sur., V, p. 36.

Chester: Chester, Illinois.

Streblotrypa hamiltonensis (Nicholson).

1874. Ceriopora ? Hamiltonensis. Nicholson, Geol. Mag., new ser., I, p. 161, pl. ix, 17.
1874. Ceriopora ? Hamiltonensis. Nicholson, Pal. Ontario, p. 97, fig. 33.
1883. Callopora Hamiltonensis. Hall, Trans. Albany Institute, X, p. 182 (abstract, 1881, p. 182).
1887. Acanthoclema Hamiltonense. Hall and Simpson, Pal. New York, VI, p. 191, pl. lv, 18–26.
1889. Streblotrypa hamiltonensis. Miller, North American Geol. Pal., p. 326.
1889. Rhombopora Hamiltonensis. Nicholson and Lyddeker, Manual Paleontology, I, fig. 455 B (p. 610), fig. 478 (p. 632).
1890. Streblotrypa hamiltonensis. Ulrich, Geol. Surv. Illinois, VIII, p. 648.
1897. Streblotrypa Hamiltonense. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. xix, 14, 15.
1898. Streblotrypa Hamiltonensis. Whiteaves, Contr. Canadian Pal., I, Part V, p. 378.
1899. Streblotrypa hamiltonense. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 167, fig. 59.
1884. Callopora bipunctata. Hall, Rep. State Geologist New York for the year 1883, p. 15.
Hamilton: Arkona and Widder, Ontario; Hamburg and New Berlin, New York.

Streblotrypa hertzeri Ulrich.

1888. Streblotrypa hertzeri. Ulrich, Bull. Denison Univ., IV, p. 85, pl. xiv, 8.
Waverly: Richfield and Lodi, Ohio.
Keokuk: Keokuk, Iowa.

Streblotrypa major Ulrich.

1888. Streblotrypa major. Ulrich, Bull. Denison Univ., IV, p. 84, pl. xiv, 10.
1890. Streblotrypa major. Ulrich, Geol. Surv. Illinois, VIII, p. 666, pl. lxxi, 8–8*d*, pl. lxxii, 1, 1*a*.
1894. Streblotrypa major. Keyes, Missouri Geol. Surv., V, p. 35.
Waverly: Richfield, Ohio.
Keokuk: Kings Mountain, Kentucky; Keokuk, Iowa; Nauvoo, Illinois.

Streblotrypa multiporata Ulrich.

1888. Streblotrypa multiporata. Ulrich, Bull. Denison Univ., IV, p. 87, pl. xiv, 11.
Waverly: Moots Run, Ohio.

Streblotrypa nicklesi Ulrich.

1884. Streblotrypa nicklesi. Ulrich (Mss.).
1884. Streblotrypa Nicklesi. Vine, Proc. Yorkshire Geol. Polyt. Soc., VIII, p. 107, pl. xxi, 4, 5.
1885. Streblotrypa Nicklesi. Vine, Proc. Yorkshire Geol. Polyt. Soc., IX, p. 96.
1890. Streblotrypa nicklesi. Ulrich, Geol. Surv. Illinois, VIII, p. 667, pl. lxxi, 9–9*c*.
1894. Streblotrypa nicklesi. Keyes, Missouri Geol. Surv., V, p. 36.
Chester: Kaskaskia, Chester, Red Bud, Anna, and other localities, Illinois; Sloans Valley, Kentucky.
Carboniferous: England (Vine).
Obs. See also Streblotrypa prisca (Gabb and Horn).

Streblotrypa obliqua Ulrich.

1888. Streblotrypa obliqua. Ulrich, Bull. Denison Univ., IV, p. 85, pl. xiv, 9.
Waverly: Lodi, Ohio.

Streblotrypa prisca (Gabb and Horn).

1862. Cavea prisca. Gabb and Horn, Jour. Acad. Nat. Sci. Philadelphia, ser. 2, V, p. 175, pl. xxi, 67.

Carboniferous: Fort Belknap, Texas.

Obs. This species resembles Streblotrypa nicklesi Ulrich, but has much larger cells.

Streblotrypa radialis Ulrich.

1890. Streblotrypa radialis. Ulrich, Geol. Surv. Illinois, VIII, p. 667, pl. lxxii, 2–2*c*.

1894. Streblotrypa radialis. Keyes, Missouri Geol. Surv., V, p. 35.

Keokuk: Near Nauvoo, Illinois; Bentonsport, Iowa.

Streblotrypa regularis Ulrich.

1888. Streblotrypa regularis. Ulrich, Bull. Denison Univ., IV, p. 88, pl. xiv, 14.

Waverly: Burbank and Cuyahoga County, Ohio.

Streblotrypa scutulata (Hall).

1883. Trematopora scutulata. Hall, Trans. Albany Institute, X, p. 180 (abstract, 1881, p. 180).

1884. Trematopora scutulata. Hall, Rep. State Geologist New York for the yea 1883, p. 7.

1887. Acanthoclema scutulatum. Hall and Simpson, Pal. New York, VI, p. 190, pl. lv, 15, 16, ? 17; pl. lvi, 19, ? 20.

1890. Streblotrypa scutulata. Ulrich, Geol. Surv. Illinois, VIII, p. 648.

1899. Acanthoclema scutulatum. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 166, fig. 58.

Hamilton: York and Hamburg, New York.

Streblotrypa striata Ulrich.

1888. Streblotrypa striata. Ulrich, Bull. Denison Univ., IV, p. 87, pl. xiv, 12, 12*a*.

Waverly: Richfield and Cuyahoga County, Ohio.

Streblotrypa subspinosa Ulrich.

1890. Streblotrypa subspinosa. Ulrich, Geol. Surv. Illinois, VIII, p. 668, pl. lxxi, 7, 7*a*.

Chester: Chester, Illinois; Sloans Valley, Kentucky.

Stromatopora lichenoides James. See **Arthropora shafferi (Meek).**

STROMATOTRYPA Ulrich. Genotype: **Stromatotrypa ovata Ulrich.**

1893. Stromatotrypa. Ulrich, Geol. Minnesota, III, p. 301.

Stromatotrypa ovata Ulrich.

1893. Stromatotrypa ovata. Ulrich, Geol. Minnesota, III, p. 302, pl. xxiv, 24–31.

Trenton (Stones River and Black River): Minneapolis and St. Paul, Minnesota; Beloit, Wisconsin.

STROTOPORA Ulrich. Genotype: **Strotopora foveolata Ulrich.**

1890. Strotopora. Ulrich, Geol. Surv. Illinois, VIII, pp. 383, 486.

1889. Strotopora. (Ulrich, in press), Miller, North American Geol. Pal., p. 326.

1896. Strotopora. Ulrich, Zittel's Textb. Pal. (Engl. ed.), p. 270.

1897. Strotopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 560.

Strotopora dermata Ulrich.

1890. Strotopora dermata. Ulrich, Geol. Surv. Illinois, VIII, p. 488, pl. lxxvii, 8, 8*a*.

1894. Strotopora dermata. Keyes, Missouri Geol. Surv., V, p. 17.

Strotopora dermata Ulrich—Continued.

1897. Strotopora dermata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 127 (p. 560).

Keokuk: Keokuk, Iowa; Warsaw, Illinois.

Strotopora foveolata Ulrich.

1890. Strotopora foveolata. Ulrich, Geol. Surv. Illinois, VIII, p. 487, pl. lxxvii, 9, 9*a*.

1894. Strotopora foveolata. Keyes, Missouri Geol. Surv., V, p. 17.

1896. Strotopora foveolata. Ulrich, Zittel's Textb. Pal. (Engl. ed.), fig. 445 (p. 270).

1897. Strotopora foveolata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 126 (p. 560).

Keokuk: Bentonsport, Iowa; Warsaw, Illinois.

Strotopora perminuta Ulrich.

1890. Strotopora perminuta. Ulrich, Geol. Surv. Illinois, VIII, p. 487, pl. xlvii, 4–4*b*.

Hamilton: Falls of the Ohio.

Subretepora D'Orbigny. Not recognized (see Geol. Surv. Illinois, VIII, p. 687).

1850. Subretepora. D'Orbigny, Prodr. de Pal., I, p. 22.

Subretepora angulata Miller. See Phylloporina angulata (Hall).

Subretepora aspera Miller. See Phylloporina aspera (Hall).

Subretepora asperato-striata Miller. See Phylloporina asperato-striata (Hall).

Subretepora clathrata Miller. See Phylloporina clathrata (Miller and Dyer).

Subretepora corticosa Miller. See Phylloporina corticosa (Ulrich).

Subretepora dawsoni Miller. See Phylloporina dawsoni Ulrich.

Subretepora dichotoma Miller. See Thamniscus dichotomus (Hall).

Subretepora fenestrata Miller. See Phylloporina fenestrata (Hall).

Subretepora gracilis Miller. See Phylloporina gracilis (Hall).

Subretepora incepta Miller. See Phylloporina incepta (Hall).

Subretepora reticulata Miller. See Phylloporina reticulata (Hall).

Subretepora trentonensis Miller. See Phylloporina trentonensis (Nicholson).

Subretepora variolata Miller. See Phylloporina variolata (Ulrich).

Sulcopora D'Orbigny. Not recognized (see Geol. Surv. Illinois, VIII, p. 687).

1850. Sulcopora. D'Orbigny, Prodr. de Pal., I, p. 22.

Sulcopora fenestrata D'Orbigny. See Rhinidictya fenestrata (Hall).

SYNOCLADIA King. Genotype: Retepora virgulacea Phillips.

1849. Synocladia. King, Ann. Mag. Nat. Hist., ser. 2, II, p. 388.

1850. Synocladia. King, Mon. Permian Foss., p. 38.

1854. Synocladia. McCoy, Brit. Pal. Foss., p. 114.

1875. Synocladia. Etheridge, Jun., Proc. Geol. Assoc., IV, p. 116.

1885. Synocladia. Hall, Rep. State Geologist New York for the year 1884, p. 37.

1885. Synocladia. Waagen and Pichl, Pal. Indica, Ser., XIII, pp. 774, 801.

1886. Synocladia. Ulrich, Contr. American Pal., I, p. 6.

SYNOCLADIA King—Continued.

1889. Synocladia. Miller, North American Geol. Pal., p. 326.
1890. Synocladia. Ulrich, Geol. Surv. Illinois, VIII, p. 398.
1895. Synocladia. Simpson, Thirteenth Ann. Rep. State Geologist New York for the year 1893, pp. 720, 726; Forty-seventh Ann. Rep. New York State Mus., pp. 914, 920.
1896. Synocladia. Ulrich, Zittel's Textb. Pal. (Eng. ed.), p. 283.
1897. Synocladia. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pp. 513, 521.

Synocladia biserialis Swallow. See Septopora biserialis (Swallow).

Synocladia biserialis var. gracilis Meek. See Septopora biserialis-gracilis Meek.

Synocladia rectistyla Whitfield. See Septopora rectistyla (Whitfield).

Synocladia virgulacea Swallow (not Phillips, nor King). See Septopora biserialis (Swallow).

Obs. See also Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pp. 513, 514.

Tabulipora Young. See Stenopora Lonsdale.

TÆNIODICTYA Ulrich. Genotype: Tæniodictya ramulosa Ulrich.

1890. Tæniodictya. Ulrich, Geol. Surv. Illinois, VIII, p. 393.
1889. Tæniodictya. (Ulrich, in press), Miller, North American Geol. Pal., p. 327.
1897. Tæniodictya. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 533.

Tæniodictya cingulata Ulrich.

1890. Tæniodictya cingulata. Ulrich, Geol. Surv. Illinois, VIII, p. 530, pl. lxvii, 3–3*b*, fig. 2*b* (p. 304).
Keokuk: Warsaw, Illinois.

Tæniodictya frondosa Ulrich.

1890. Tæniodictya frondosa. Ulrich, Geol. Surv. Illinois, VIII, p. 259, pl. lxvii, 5, pl. lxix, 5–5*c*.
1894. Tæniodictya frondosa. Keyes, Missouri Geol. Surv., V, p. 22.
Keokuk: Keokuk, Iowa; Nauvoo, Illinois.

Tæniodictya interpolata Ulrich.

1888. Tæniodictya interpolata. Ulrich, Bull. Denison Univ., IV, p. 80, pl. xiii, 9, 9*a*.
Waverly: Richfield and Cuyahoga County, Ohio.

Tæniodictya ramulosa Ulrich.

1890. Tæniodictya ramulosa. Ulrich, Geol. Surv. Illinois, VIII, p. 528, pl. lxvii, 1–1*l*.
1894. Tæniodictya ramulosa. Keyes, Missouri Geol. Surv., V, p. 22.
1897. Tæniodictya ramulosa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 89, 90 (p. 533).
Keokuk: Keokuk, Iowa; Nauvoo and Warsaw, Illinois.

Tæniodictya ramulosa-burlingtonensis Ulrich.

1890. Tæniodictya ramulosa var. burlingtonensis. Ulrich, Geol. Surv. Illinois, VIII, p. 529, pl. lxvii, 2–2*b*.
Burlington: Burlington, Iowa.

Tæniodictya ? rhomboidea (Hall).

1883. Stictopora rhomboidea. Hall, Trans. Albany Institute, X, p. 157 (abstract, 1881, p. 15).

1886. Stictopora rhomboidea. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxix, 27, 28.

1887. Stictopora rhomboidea. Hall and Simpson, Pal. New York, VI, p. 95, pl. xxix, 27, 28.

Upper Helderberg: West of Le Roy, New York.

Tæniodictya subrecta Ulrich.

1890. Tæniodictya subrecta. Ulrich, Geol. Surv. Illinois, VIII, p. 530, pl. lxvii, 4–4*d*.

St. Louis: Elizabethtown, Kentucky.

TÆNIOPORA Nicholson. Genotype: Tæniopora exigua Nicholson.

1874. Tæniopora. Nicholson, Canadian Jour., new ser., XIV, p. 133.

1874. Tæniopora. Nicholson, Geol. Mag., new ser., I, p. 121.

1874. Tæniopora. Nicholson, Pal. Province Ontario, p. 107.

1883. Tæniopora. Hall, Trans. Albany Institute, X, p. 192 (abstract, 1881, p. 192).

1884. Tæniopora. Hall, Rep. State Geologist New York for the year 1883, p. 49.

1887. Tæniopora. Hall and Simpson, Pal. New York, VI, p. xxi.

1889. Tæniopora. Miller, North American Geol. Pal., p. 327.

1890. Tæniopora. Ulrich, Geol. Surv. Illinois, VIII, p. 386.

1896. Tæniopora. Ulrich, Zittel's Textb. Pal. (Eng. ed.), p. 280.

1897. Tæniopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 533.

1899. Tæniopora. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 174.

1883. Pteropora. Hall, Trans. Albany Institute, X, p. 192 (abstract, 1881, p. 192).

1897. Stictoporidra. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 527.

1897. Stictoporina (in error for Stictoporidra). Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 532 (not p. 543).

Tæniopora exigua Nicholson.

1874. Tæniopora exigua. Nicholson, Geol. Mag., new ser., I, p. 122, pl. vi, 13.

1874. Tæniopora exigua. Nicholson, Pal. Province Ontario, p. 108, fig. 47.

1883. Tæniopora exigua. Hall, Trans. Albany Institute, X, p. 192 (abstract, 1881, p. 192).

1884. Tæniopora exigua. Hall, Rep. State Geologist New York for the year 1883, p. 49.

1887. Tæniopora exigua. Hall and Simpson, Pal. New York, VI, p. 263, pl. lxii, 15–26.

1897. Tæniopora exigua. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xi, 12–16, pl. xii, 1–5.

1899. Tæniopora exigua. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 174, fig. 71.

1883. Pteropora duogeneris. Hall, Trans. Albany Institute, X, p. 192 (abstract, 1881, p. 192).

Hamilton: Arkona, Ontario; Bellona, West Hamburg, and other localities in New York.

Tæniopora occidentalis Ulrich.

1890. Tæniopora occidentalis. Ulrich, Geol. Sur. Illinois, VIII, p. 505, pl. xlii, 3–3*c*.

Hamilton: Buffalo, Iowa.

Tæniopora penniformis Nicholson.

1874. Tæniopora penniformis. Nicholson, Geol. Mag., new ser., I, p. 123, pl. vi, 12.

1874. Tæniopora penniformis. Nicholson, Pal. Province Ontario, p. 109, fig. 46.

1890. Tæniopora penniformis. Ulrich, Geol. Sur. Illinois, VIII, p. 505, pl. xlii, 3*d*.

Hamilton: Arkona, Ontario; Eighteenmile Creek, New York.

Tæniopora recubans (Hall and Simpson).

1887. Stictopora recubans. Hall and Simpson, Pal. New York, VI, p. 260, pl. lxiii, 20, 21.

1891. Stictopora recubans. Hall, Tenth Ann. Rep. State Geologist New York for the year 1890, p. 51; Forty-fourth Ann. Rep. New York State Mus., p. 81.

Hamilton: Seneca Lake, New York.

Obs. This may be identical with Tæniopora subcarinata (Hall).

Tæniopora subcarinata (Hall).

1883. Stictopora? subcarinata. Hall, Trans. Albany Institute, X, p. 191 (abstract, 1881, p. 191).

1887. Stictopora subcarinata. Hall and Simpson, Pal. New York, VI, p. 261, pl. lxiii, 1–6.

1891. Stictopora subcarinata. Hall, Tenth Ann. Rep. State Geologist New York for the year 1890, p. 52; Forty-fourth Ann. Rep. New York State Mus., p. 82

1897. Stictoporina subcarinata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. x, 8, pl. xii, 6.

1884. Stictopora? dichotoma. Hall, Rep. State Geologist New York for the year 1883, p. 48.

Hamilton: Bellona, Alden Station, and York, New York.

Obs. See note under Tæniopora recubans (Hall).

Tectulipora Hall. See Loculipora Hall.

Tectulipora biperforata Simpson. See Loculipora loculata (Hall).

Tectulipora loculata Simpson. See Loculipora loculata (Hall).

Tectuliporella Simpson. See Isotrypa Hall.

Tectuliporella consimilis Simpson. See Isotrypa consimilis Hall.

THALLOSTIGMA Hall. Genotype: Thallostigma intercellata Hall.

1883. Thallostigma. Hall, Trans. Albany Institute, X, p. 154 (abstract, 1881, p. 12).

Obs.—This name seems to have been regarded by its author in his later work as a synonym of Fistulipora. The original definition is of little value, but a study of the genotype is likely to show that the name may be held for a group of species now included under Lioclema, of which Lioclema minutum (Rominger) is a typical example. Having no authentic specimens of the genotype, we have not made these changes, but have left this species and the closely allied, if not identical, Hamilton group forms under Lioclema.

Thallostigma confertipora Hall. See Lioclema confertiporum (Hall).

Thallostigma decipiens Hall. See Lioclema decipiens (Hall).

Thallostigma densa Hall. See Lioclema densum (Hall).

Thallostigma digitata Hall. See Lioclema digitatum (Hall).

Thallostigma inclusa Hall. See Favicella inclusa (Hall).

Thallostigma inclusapora Hall. See Favicella inclusa (Hall).

Thallostigma intercellata Hall. See Lioclema intercellatum (Hall).

Thallostigma lamellata Hall. See Fistulipora ? lamellata (Hall).
Thallostigma longimacula Hall. See Fistulipora ? longimacula (Hall).
Thallostigma micropora Hall. See Lioclema microporum (Hall).
Thallostigma multaculeata Hall. See Lioclema multaculeatum (Hall).
Thallostigma plana Hall. See Pinacotrypa plana (Hall).
Thallostigma scrobiculata Hall. See Fistulipora ? scrobiculata (Hall).
Thallostigma segregata Hall. See Lioclema segregatum (Hall).
Thallostigma serrulata Hall. See Pinacotrypa serrulata (Hall).
Thallostigma sparsipora Hall. See Prismopora sparsipora (Hall).
Thallostigma spheroidea Hall. See Lioclema ? spheroideum (Hall).
Thallostigma striata Hall. See Lioclema minutum (Rominger).
Thallostigma subtilis Hall. See Lioclema subtile (Hall).
Thallostigma triangularis Hall. See Fistulipora ? triangularis (Hall).
Thallostigma umbilicata Hall. See Fistulipora ? umbilicata (Hall).
Thallostigma variapora Hall. See Pinacotrypa variapora (Hall).

Thamnicella ascuta Simpson.

1897. Thamnicella ascuta Hall. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. ix, 6–8.

Obs. Simpson ascribes this species to Hall, but we are unable to find it in any of the latter's works.

Thamnicella Cisseis Simpson. See Drymotrypa cisseis (Hall).
Thamnicella Nysa Simpson. See Thamniscus nysa Hall.

THAMNISCUS King. Genotype: Ceratophytes dubius Schlotheim.

1849. Thamniscus. King, Ann. Mag. Nat. Hist., ser. 2, II, p. 389.
1850. Thamniscus. King, Perm. Foss. England, p. 44.
1860. Thamniscus. Eichwald, Lethæa Rossica, I, p. 386.
1875. Thamniscus. Etheridge, Jun., Proc. Geol. Assoc., IV, p. 120.
1882. Thamniscus. Shrubsole, Quar. Jour. Geol. Soc. London, XXXVIII, p. 343.
1885. Thamniscus. Vine, Proc. Yorkshire Geol. Polyt. Soc., IX, p. 89.
1885. Thamniscus. Waagen and Pichl, Pal. Indica, Ser. XIII, p. 807.
1886. Thamniscus. Ulrich, Contr. American Pal., I, p. 5.
1887. Thamniscus. Hall and Simpson, Pal. New York, VI, p. xxii.
1889. Thamniscus. Miller, North American Geol. Pal., p. 327.
1890. Thamniscus. Ulrich, Geol. Sur. Illinois, VIII, pp. 397, 606.
1896. Thamniscus. Ulrich, Zittel's Textb. Pal. (Eng. ed.), p. 283.
1897. Thamniscus. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 524.

Thamniscus ? Cisseis Hall. See Drymotrypa cisseis (Hall).

Thamniscus dichotomus (Hall).

1852. Hornera ? dichotoma. Hall, Pal. New York, II, p. 163, pl. xlC, 3*a*–*d*.
1889. Subretepora dichotoma. Miller, North American Geol. Pal., p. 326.
1890. Thamniscus dichotoma. Ulrich, Geol. Sur. Illinois, VIII, p. 607.

Niagara: Lockport and Rochester, New York.

Thamniscus divaricans Ulrich.

1890. Thamniscus divaricans. Ulrich, Geol. Sur. Illinois, VIII, p. 608, pl. lxii, 6–6*c*.

Keokuk: Kings Mountain, Kentucky.

Thamniscus fruticellus Hall.

1879. Thamniscus fruticella. Hall, Thirty-second Ann. Rep. New York State Museum, p. 176 (reprint, 1880, p. 37).
1883. Thamniscus fruticella. Hall, Rep. State Geologist New York for the year 1882, pl. xxii, 33.
1887. Thamniscus fruticella. Hall and Simpson, Pal. New York, VI, p. 42, pl. xxii, 33.
Lower Helderberg: Clarksville, New York.

Thamniscus furcillatus Ulrich.

1890. Thamniscus furcillatus. Ulrich, Geol. Sur. Illinois, VIII, p. 609, pl. lxii, 9–9*b*.
1894. Thamniscus furcillatus. Keyes, Missouri Geol. Sur., V, p. 31, pl. xxxiii, 6.
Chester: Chester, Kaskaskia, Red Bud, and other localities in Illinois; Sloans Valley and Litchfield, Kentucky.

Thamniscus multiramus Hall.

1883. Thamniscus multiramus. Hall, Trans. Albany Institute, X, p. 161 (abstract, 1881, p. 19).
1883. Thamniscus multiramus. Hall, Rep. State Geologist New York for the year 1882, pl. xxvi, 1–5.
1887. Thamniscus multiramus. Hall and Simpson, Pal. New York, VI, p. 104, pl. xxxiii, 1–5.
Upper Helderberg: Schoharie, New York.

Thamniscus nanus Hall.

1883. Thamniscus nanus. Hall, Trans. Albany Institute, X, p. 161 (abstract, 1881, p. 19).
1887. Thamniscus nanus. Hall and Simpson, Pal. New York, VI, p. 292, pl. lxvi, 11–13.
1897. Thamniscus nanus. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. ix, 18.
Hamilton: Falls of the Ohio.

Thamniscus ? Niagarensis Hall. See Drymotrypa niagarensis (Hall).

Thamniscus nysa Hall.

1879. Thamniscus Nysa. Hall, Thirty-second Ann. Rep. New York State Museum, p. 175 (reprint, 1880, p. 38); and var., p. 176 (reprint, p. 38).
1883. Thamniscus Nysa. Hall, Rep. State Geologist New York for the year 1882, pl. xxii, 47, 48; and var., pl. xxii, 31, 32.
1887. Thamniscus Nysa. Hall and Simpson, Pal. New York, VI, p. 43, pl. xxii, 31, 32, 47, 48.
1897. Thamnicella Nysa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. ix, 4, 5.
Lower Helderberg: Clarksville, New York.

Thamniscus octonarius Ulrich.

1890. Thamniscus octonarius. Ulrich, Geol. Sur. Illinois, VIII, p. 611, pl. lxii, 7–7*b*.
Upper Coal Measures: Greenwood County, Kansas.

Thamniscus pauciramus Hall.

1883. Thamniscus pauciramus. Hall, Trans. Albany Institute, X, p. 197 (abstract, 1881, p. 197).
1884. Thamniscus pauciramus. Hall, Rep. State Geologist New York for the year 1883, p. 60.
1887. Thamniscus pauciramus. Hall and Simpson, Pal. New York, VI, p. 274.

Thamniscus pauciramus Hall—Continued.

1891. Thamniscus pauciramus. Hall, Tenth Ann. Rep. State Geologist New York for the year 1890, p. 55; Forty-fourth Ann. Rep. New York State Museum, p. 85.

Hamilton: Monteiths Point, Lake Canandaigua, New York.

Thamniscus ramulosus Ulrich.

1890. Thamniscus ramulosus. Ulrich, Geol. Sur. Illinois, VIII, p. 610, pl. lxii, 4–4*b*.

Chester: Sloans Valley, Kentucky; Chester, Illinois.

Thamniscus ramulosus var. sevillensis Ulrich. See Thamniscus sevillensis Ulrich.

Thamniscus sculptilis Ulrich.

1890. Thamniscus sculptilis. Ulrich, Geol. Sur. Illinois, VIII, p. 608, pl. lxii, 8–8*b*.

Keokuk: Kings Mountain, Kentucky.

Thamniscus sevillensis Ulrich.

1890. Thamniscus ramulosus var. sevillensis. Ulrich, Geol. Sur. Illinois, VIII, p. 610, pl. lv, 6, pl. lxii, 5, 5*a*.

Lower Coal Measures: Seville, Illinois.

Thamniscus variolatus Hall.

1879. Thamniscus variolata. Hall, Thirty-second Ann. Rep. New York State Museum, p. 175 (reprint, 1880, p. 37).

1883. Thamniscus variolata. Hall, Rep. State Geologist New York for the year 1882, pl. xxii, 34–46.

1887. Thamniscus variolata. Hall and Simpson, Pal. New York, VI, p. 41, pl. xxii, 34–46.

1897. Thamniscus variolata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. ix, 14.

Lower Helderberg: Clarksville, New York.

Thamnocella Simpson. See Drymotrypa Ulrich.

Thamnocella Cisseis Simpson. See Drymotrypa cisseis (Hall).

Thamnopora Hall (not Steininger). See Thamnotrypa Hall.

Thamnopora divaricata Hall. See Thamnotrypa divaricata (Hall).

THAMNOTRYPA Hall. Genotype: Thamnopora divaricata Hall.

1883. Thamnopora. Hall, Trans. Albany Institute, X, p. 158 (abstract, 1881, p. 16). (Name was preoccupied by Steininger.)

1887. Thamnotrypa. Hall and Simpson, Pal. New York, VI, p. xxi.

1889. Thamnotrypa. Miller, North American Geol. Pal., p. 328.

1897. Thamnotrypa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 546.

Obs. Thamnotrypa is probably a synonym of Tæniopora Nicholson.

Thamnotrypa divaricata (Hall).

1883. Thamnopora divaricata. Hall, Trans. Albany Institute, X, p. 158 (abstract, 1881, p. 16).

1883. Thamnopora divaricata. Hall, Rep. State Geologist New York for the year 1882, pl. xxvi, 9, 10.

1887. Thamnotrypa divaricata. Hall and Simpson, Pal. New York, VI, p. 101, pl. xxxiii, 9, 10.

1897. Thamnotrypa divaricata. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xii, 7, 8.

Upper Helderberg: Near Buffalo, New York.

Cystodictya incisurata (
1883. Stictopora incis
1881, p. 189).
1884. Stictopora incisu
1883, p. 38.
1887. Stictopora incis
lx, 1–18.
1890. Cystodictya inc
1897. Cystodictya in
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1898. Cystodictya in
1899. Stictopora inci
fig. 67.
1883. Stictopora in
1881, p. 18
1884. Stictopora in
1883, p. 40
1883. Stictopora o
1881, p. 1
1884. Stictopora
1883, p.
1883. Stictopora
1881, p.
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TREMATELLA

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Trematella [illegible]

[illegible]

Trematella arborea (*Hall*).
1887. *Trematopora arborea.* Hall. [illegible]
1887. [illegible]
1886. *Trematella arborea.* Hall. Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxv. [illegible]
1887. *Trematopora Trematella arborea.* Hall and Simpson. Pal. New York, VI, p. [illegible], pl. xxv. [illegible]
Hamilton. Falls of the Ohio.

Trematella glomerata (*Hall*).
1886. *Trematella glomerata.* Hall. Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxv. 4, 5.
1887. *Trematopora Trematella glomerata.* Hall and Simpson. Pal. New York, VI, p. 70, pl. xxv. 4, 5.
Upper Helderberg: Onondaga Valley, New York.

Trematella nodosa (*Hall and Simpson*).
1887. *Trematopora Trematella nodosa.* Hall and Simpson. Pal. New York, VI, p. 176.
Hamilton. Jayox's Run, New York.

Trematella perspinulata (*Hall*).
1881. *Trematopora perspinulata.* Hall. Trans. Albany Institute, X, p. [illegible] abstract. 1881, p. 18[illegible].
1883. *Trematopora perspinulata.* Hall. Rep. State Geologist New York for the year 1882, p. [illegible]
1887. *Trematopora Trematella perspinulata.* Hall and Simpson, Pal. New York, VI, p. 17[illegible].

ella perspinulata (Hall)—Continued.

. Batostomella perspinulata. Ulrich, Geol. Minnesota, III, p. 229.
Hamilton: York, New York.

ATOPORA Hall. Genotype: **Trematopora tuberculosa** Hall.

2. Trematopora. Hall, Pal. New York, II, p. 149.
). Trematopora. Eichwald, Lethæa Rossica, I, p. 494.
7. Trematopora. Dybowski, Die Chætetiden der Ostbaltischen Silur-Form., p. 69.
7. Trematopora. Hall and Simpson, Pal. New York, VI, p. xiv.
9. Trematopora. Miller, North American Geol. Pal., p. 328.
0. Trematopora. Ulrich, Geol. Sur. Illinois, VIII, pp. 373, 418.
93. Trematopora. Ulrich, Geol. Minnesota, III, p. 308.
97. Trematopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 591.
Not Trematopora. Ulrich, Jour. Cincinnati Soc. Nat. Hist., V, 1882, pp. 153, 241; ibid., VI, 1883, p. 257 (=Homotrypa).

natopora alternata Hall. See Acanthoclema alternatum (Hall).

natopora ?? americana Miller.

1881. Trematopora americana. Miller, Jour. Cincinnati Soc. Nat. Hist., IV, p. 312, pl. vii, 5, 5*a*.
Burlington: New Mexico.

matopora ? annulata Hall. See Trematella annulata (Hall).

matopora (Trematella) annulata Hall and Simpson. See Trematella annulata (Hall).

ematopora annulata var. pronaspina Hall. See Trematella annulata (Hall).

ematopora annulifer Whitfield. See Lioclemella annulifera (Whitfield).

rematopora arborea Hall. See Trematella arborea (Hall).

rematopora (Trematella) arborea Hall and Simpson. See Trematella arborea (Hall).

Trematopora aspera Hall. See Batostomella ? aspera (Hall).

Trematopora (Orthopora) bispinulata Hall and Simpson. See Streblotrypa ? bispinulata (Hall).

Trematopora calloporoides Ulrich.

1890. Trematopora calloporoides. Ulrich, Geol. Sur. Illinois, VIII, p. 420, pl. xxxviii, 1-1*d*.
Trenton: Alexander County, Illinois.

Trematopora camerata Hall. See Chilotrypa camerata (Hall).

Trematopora canaliculata Hall. See Orthopora canaliculata (Hall).

Trematopora (Orthopora) canaliculata Hall. See Orthopora canaliculata (Hall).

Trematopora carinata Whiteaves. See Orthopora carinata (Hall and Simpson).

Trematopora (Orthop[illegible]) carinata Hall and Simpson. See Orthopora carinata (Hall an[illegible]on).

rematopora cl[illegible]all. See Stictoporina claviformis (Hall).

Trematopora coalescens Hall. See **Chilotrypa ? coalescens (Hall.)**

Trematopora constricta Hall. See **Chilotrypa ? constricta (Hall).**

Trematopora corticosa Hall. See **Eridotrypa corticosa (Hall).**

Trematopora (Chætetes) corticosa Hall. See **Eridotrypa corticosa (Hall).**

Trematopora ? (Trematella ?) corticosa Hall. See **Eridotrypa corticosa (Hall).**

Trematopora crassa Hall. See **Fistulipora crassa (Hall).**

Trematopora crebripora Hall. Not recognizable.

1883. Trematopora (Chætetes) crebripora. Hall, Trans. Albany Institute, X, p. 59 (abstract 1879, p. 3).

1882. Trematopora (Chætetes) crebripora. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 236.

Niagara: Waldron, Indiana.

Trematopora debilis Ulrich.

1890. Trematopora debilis. Ulrich, Geol. Sur. Illinois, VIII, p. 419, pl. xxxiv, 3–3*e*.

Trenton: Alexander County, Illinois.

Trematopora densa Hall. See **Monotrypella ? densa (Hall).**

Trematopora (Chætetes) densa Hall. See **Monotrypella ? densa (Hall).**

Trematopora dispersa Hall. See **Chilotrypa dispersa (Hall).**

Trematopora echinata Hall. See **Eridotrypa echinata (Hall).**

Trematopora (Orthopora) elongata Hall and Simpson. See **Orthopora elongata (Hall and Simpson).**

Trematopora ?? fragilis Winchell.

1864. Trematopora fragilis. Winchell, Proc. Acad. Nat. Sci. Philadelphia, p. 3.

Burlington: Burlington, Iowa.

Trematopora (Trematella) glomerata Hall and Simpson. See **Trematella glomerata (Hall).**

Trematopora (Orthopora) granifera Hall and Simpson. See **Orthopora granifera (Hall and Simpson).**

Trematopora (Orthopora) granilinea Hall and Simpson. See **Orthopora granilinea (Hall and Simpson).**

Trematopora ? granistriata Hall. See **Bactropora granistriata (Hall).**

Trematopora ?? granulata Whitfield.

1878. Trematopora granulata. Whitfield, Ann. Rep. Geol. Sur. Wisconsin for the year 1877, p. 68.

1882. Trematopora granulata. Whitfield, Geol. Sur. Wisconsin, IV, p. 253, pl. xi, 22, 23.

Cincinnati (Richmond): Delafield, Wisconsin.

Obs. This species probably belongs to the genus Eridotrypa.

Trematopora granulifera Hall. See **Batostomella granulifera (Hall).**

Trematopora halli Ulrich.

1883. Trematopora halli. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 261, pl. xiii, 3, 3*a*.

Niagara: Waldron, Indiana.

Trematopora (Orthopora) hexagona Hall and Simpson. See Orthopora hexagona (Hall and Simpson).

Trematopora (Orthopora) immersa Hall and Simpson. See Orthopora immersa (Hall and Simpson).

Trematopora infrequens Hall. See Diamesopora infrequens (Hall).

Trematopora (Orthopora) interplana Hall and Simpson. See Orthopora interplana (Hall and Simpson).

Trematopora (Callopora) irregularis Hall. See Chilotrypa irregularis (Hall).

Trematopora (Orthopora) lineata Hall and Simpson. See Orthopora lineata (Hall and Simpson).

Trematopora ? (Trachypora ?) macropora Hall. See Nematopora macropora (Hall).

Trematopora maculosa Hall. See Fistulipora maculosa (Hall).

Trematopora minuta Hall. See Nematopora minuta (Hall).

Trematopora ? (Trachypora ?) minuta Hall. See Nematopora minuta (Hall).

Trematopora ? nitida Ulrich. See Lioclemella nitida (Ulrich).

Trematopora (Orthopora) nodosa Hall. Not defined.

1887. Trematopora (Orthopora) nodosa. Hall, Pal. New York, VI, pl. xxiii, 10. Lower Helderberg: Clarksville, New York.

Trematopora (Trematella) nodosa Hall and Simpson. See Trematella nodosa (Hall and Simpson).

Trematopora orbipora Hall. See Orthopora orbipora (Hall).

Trematopora (Orthopora ?) orbipora Hall and Simpson. See Orthopora orbipora (Hall).

Trematopora ornata Ulrich. See Trematopora ? primigenia-ornata Ulrich.

Trematopora (Orthopora) ornata Hall and Simpson. See Orthopora ornata (Hall and Simpson).

Trematopora osculum Hall. See Diamesopora osculum (Hall).

Trematopora ostiolata Hall. See Chilotrypa ostiolata (Hall).

Trematopora ovatipora Hall. See Orthopora ovatipora (Hall).

Trematopora (Orthopora) ovatipora Hall and Simpson. See Orthopora ovatipora (Hall).

Trematopora parallela Hall. See Orthopora parallela (Hall).

Trematopora (Orthopora) parallela Hall and Simpson. See Orthopora parallela (Hall).

Trematopora perspinulata Hall. See Trematella perspinulata (Hall).

Trematopora (Trematella) perspinulata Hall and Simpson. See Trematella perspinulata (Hall).

Trematopora polygona Hall. See Orthopora polygona (Hall).

Trematopora (Orthopora) polygona Hall and Simpson. See Orthopora polygona (Hall).

Trematopora ponderosa Hall. See Fistulipora maculosa (Hall).

Trematopora ? primigenia Ulrich.

1886. Trematopora primigenia. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Sur. Minnesota, p. 97.

1893. Trematopora ? primigenia. Ulrich, Geol. Minnesota, III, p. 309, pl. xxi, 23–40.

Trenton (Black River): Minneapolis, St. Paul, Fountain and Preston, Minnesota.

Trematopora ? primigenia-ornata Ulrich.

1886. Trematopora ornata. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Sur. Minnesota, p. 98.

1893. Trematopora ? primigenia var. ornata. Ulrich, Geol. Minnesota, III, p. 310, pl. xxi, 26, 28, 33, 34.

Trenton (Black River): Minneapolis and St. Paul, Minnesota.

Trematopora ? primigenia-spinosa Ulrich.

1893. Trematopora ? primigenia var. spinosa. Ulrich, Geol. Minnesota, III, p. 310, pl. xxi, 29, 30, 35, 36.

Trenton (Black River): Minneapolis and St. Paul, Minnesota.

Trematopora ?? punctata Hall.

1852. Trematopora punctata. Hall, Pal. New York, II, p. 151, pl. xlA, 4*a–c*.

Niagara: Lockport, New York.

Trematopora rectilinea Hall. Not recognized.

1883. Trematopora rectilinea. Hall, Trans. Albany Institute, X, p. 148 (abstract, 1881, p. 6).

Upper Helderberg: Onondaga Valley, New York.

Trematopora regularis Hall. See Orthopora regularis (Hall).

Trematopora (Orthopora) regularis Hall and Simpson. See Orthopora regularis (Hall).

Trematopora (Orthopora) reticulata Hall and Simpson. See Orthopora reticulata (Hall).

Trematopora rhombifera Hall. See Orthopora rhombifera (Hall) and Stictopora ?? granatula Hall.

Trematopora (Orthopora) rhombifera Hall and Simpson. See Orthopora rhombifera (Hall).

Trematopora scutulata Hall (Upper Helderberg). See Orthopora scutulata (Hall).

Trematopora scutulata Hall (Hamilton). See Streblotrypa scutulata (Hall).

Trematopora (Orthopora) scutulata Hall (Upper Helderberg). See Orthopora scutulata (Hall).

Trematopora signata Hall. See Callotrypa macropora-signata (Hall).

Trematopora ? singularis (Hall).

1876. Callopora singularis. Hall, Twenty-eighth Ann. Rep. New York State Museum (documentary edition), pl. x, 1, 2; ibid. (Museum edition), p. 115, pl. x, 1, 2.

1882. Callopora singularis. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 237, pl. ix, 1, 2.

1890. Leioclema singulare. Ulrich, Geol. Sur. Illinois, VIII, p. 425.

Niagara: Waldron, Indiana.

Trematopora ? spiculata Miller.

1876. Trematopora spinulosa. Hall, Twenty-eighth Ann. Rep. New York State Museum (documentary edition), pl. xi, 11, 12. (Not Trematopora spinulosa. Hall, Pal. New York, II, 1852, p. 155, pl. xlA, 11*a*, *b*.)
1877. Trematopora spiculata. Miller, American Pal. Foss., edition 2, p. 245. (Proposed for T. spinulosa, preoccupied by Hall in 1852.)
1879. Trematopora spiculata. Hall, Twenty-eighth Ann. Rep. New York State Museum (Museum edition), p. 114, pl. xi, 11, 12.
1882. Trematopora spiculata. Hall, Eleventh Ann. Rep. Indiana Geol. Nat. Hist., p. 235, pl. x, 11, 12.
Niagara: Waldron, Indiana.

Trematopora solida Hall. See Homotrypa ? solida (Hall).

Trematopora sparsa Hall. See Diploclema sparsum (Hall).

Trematopora spinulosa Hall (1852). See Bythopora spinulosa (Hall).

Trematopora spinulosa Hall (1876). See Trematopora ? spiculata Miller.

Trematopora striata Hall.

1852. Trematopora striata. Hall, Pal. New York, II, p. 153, pl. xlA, 7*a*–*d*.
Niagara: Lockport, New York.
Obs.—This is probably some species of Eridotrypa or Bythopora, but with present knowledge can not be recognized.

Trematopora subimbricata Hall. See Diamesopora subimbricata (Hall).

Trematopora subquadrata Hall. See Orthopora subquadrata (Hall).

Trematopora (Orthopora) subquadrata Hall. See Orthopora subquadrata (Hall).

Trematopora ?? superba Billings.

1866. Trematopora superba. Billings, Catal. Sil. Foss. Anticosti, p. 93.
Clinton and Niagara: Cabots Head, Lake Huron.

Trematopora tortalinea Hall. See Orthopora tortalinea (Hall).

Trematopora (Orthopora) tortalinea Hall and Simpson. See Orthopora tortalinea (Hall).

Trematopora transversa Hall. See Orthopora transversa (Hall).

Trematopora (Orthopora?) transversa Hall and Simpson. See Orthopora transversa (Hall).

Trematopora tuberculosa Hall.

1852. Trematopora tuberculosa. Hall, Pal. New York, II, p. 149, pl. xlA, 1*a*–*g*.
1883. Trematopora tuberculosa. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 259, pl. xiii, 2–2*b*.
1897. Trematopora tuberculosa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xix. 1–5.
Niagara: Lockport, New York.

Trematopora tubulosa Hall. See Diamesopora tubulosa (Hall).

Trematopora varia Hall. See Chilotrypa varia (Hall).

Trematopora variolata Hall. See Chilotrypa variolata (Hall).

Trematopora ?? vesiculosa Winchell.

1864. Trematopora vesiculosa. Winchell, Proc. Acad. Nat. Sci. Philadelphia, p. 3.
1865. Trematopora ? vesiculosa. Winchell, Proc. Acad. Nat. Sci. Philadelphia, p. 112.

Trematopora ?? vesiculosa Winchell—Continued.

1870. Trematopora ? vesiculosa. Winchell, Proc. American Phil. Soc., XI, p. 247.
Burlington: Burlington, Iowa.
Waverly: Sciotoville, Ohio; Hillsdale, Michigan.

Trematopora whitfieldi Ulrich.

1883. Trematopora whitfieldi. Ulrich, Jour. Cincinnati Soc. Nat. Hist., VI, p. 262, pl. xiii, 4, *4a*.
Niagara: Waldron, Indiana.

TRIGONODICTYA Ulrich. Genotype: Pachydictya conciliatrix Ulrich.

1893. Trigonodictya. Ulrich, Geol. Minnesota, III, p. 160.

Trigonodictya conciliatrix (Ulrich).

1886. Pachydictya conciliatrix. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Hist. Sur. Minnesota, p. 76.
1893. Trigonodictya conciliatrix. Ulrich, Geol. Minnesota, III, p. 160, pl. ix, 11, 12, pl. x, 15–20.
Trenton (Black River): Cannon Falls, Minnesota.

Trigonodictya eatonensis Ulrich.

1893. Trigonodictya eatonensis. Ulrich, Geol. Minnesota, III, p. 160.
1895. Trigonodictya eatonensis. Foerste, Geol. Sur. Ohio, VII, p. 599.
Clinton: Eaton, Ohio.

TROPIDOPORA Hall and Simpson. Genotype: Tropidopora nana Hall.

1887. Tropidopora. Hall and Simpson, Pal. New York, VI, p. xv.
1889. Tropidopora. Miller, North American Geol. Pal., p. 329.
1897. Tropidopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 553.

Tropidopora nana Hall.

1886. Tropidopora nana. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. xxv, 25, 26.
1887. Tropidopora nana. Hall and Simpson, Pal. New York, VI, p. 71, pl. xxv, 25, 26.
1897. Tropidopora nana. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. xvi, 1, 2.
Upper Helderberg: Onondaga Valley, New York.

Tuberculopora Ringueberg. Bryozoan? Genotype: Tuberculopora inflata Ringueberg.

1886. Tuberculopora. Ringueberg, Bull. Buffalo Soc. Nat. Sci., V, p. 21.

Tuberculopora inflata Ringueberg. Not recognizable.

1886. Tuberculopora inflata. Ringueberg, Bull. Buffalo Soc. Nat. Sci., V, p. 21, pl. ii, 18.
Niagara: Lockport, New York.

UNITRYPA Hall. Genotype: Fenestella (Hemitrypa) lata Hall.

1885. Unitrypa. Hall, Rep. State Geologist New York for the year 1884, p. 36.
1886. Unitrypa. Ulrich, Contr. American Pal., I, p. 4.
1887. Unitrypa. Hall and Simpson, Pal. New York, VI, p. xxiii.
1889. Unitrypa. Miller, North American Geol. Pal., p. 329.
1890. Unitrypa. Ulrich, Geol. Sur. Illinois, VIII, p. 396.
1895. Unitrypa. Simpson, Thirteenth Ann. Rep. State Geologist New York for the year 1893, pp. 689, 708, 726; Forty-seventh Ann. Rep. New York State Museum, pp. 883, 902, 920.

UNITRYPA Hall—Continued.

1897. Unitrypa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pp. 508, 520.
1899. Unitrypa. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 161.

Unitrypa acaulis (Hall).

1883. Fenestella (Hemitrypa) acaulis. Hall, Trans. Albany Institute, X, p. 175 (abstract, 1881, p. 33).
1886. Fenestella (Unitrypa) acaulis. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. li, 1–6.
1887. Fenestella (Unitrypa) acaulis. Hall and Simpson, Pal. New York, VI, p. 131, pl. li, 1–6.
1886. Unitrypa conferta. Ulrich, Contr. American Pal., I, p. 17, pl. i, 8, 8*a*.
1887. Fenestella (Unitrypa) projecta. Hall and Simpson, Pal. New York, VI, p. 132.
1888. Fenestella (Unitrypa) projecta. Hall, Seventh Ann. Rep. State Geologist New York for the year 1887, pl. xiv, 6–8; Forty-first Ann. Rep. New York State Museum, pl. xiv, 6–8.
Hamilton: Falls of the Ohio.

Unitrypa acaulis-inclinis (Hall and Simpson).

1887. Fenestella (Unitrypa) acaulis var. inclinis. Hall and Simpson, Pal. New York, VI, p. 132.
Hamilton: Falls of the Ohio.
Obs. The differences between this form and Unitrypa acaulis are scarcely of varietal importance.

Unitrypa acclivis (Hall and Simpson).

1887. Fenestella (Unitrypa) acclivis. Hall and Simpson, Pal. New York, VI, p. 138, pl. lii, 16–23.
1897. Unitrypa acclivis. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. v, 15.
Upper Helderberg: Walpole, Ontario.

Unitrypa anonyma (Hall).

1883. Fenestella (Hemitrypa) anonyma. Hall, Trans. Albany Institute, X, p. 176 (abstract, 1881, p. 34).
Hamilton: Falls of the Ohio.

Unitrypa conferta Ulrich. See Unitrypa acaulis (Hall).

Unitrypa connexa Simpson.

1897. Unitrypa connexa Hall. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. v, 12–14.
Obs. Simpson ascribes this species to Hall, but we have been unable to find it in any of Hall's works. The species apparently has not yet been described; until described the name is invalid.

Unitrypa ? elegantissima (Hall).

1883. Fenestella (Hemitrypa) elegantissima. Hall, Trans. Albany Institute, X, p. 177 (abstract, 1881, p. 35).
1886. Fenestella (Unitrypa) elegantissima. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. liii, 12–17.
1887. Fenestella (Unitrypa) elegantissima. Hall and Simpson, Pal. New York, VI, p. 140, p. liii, 12–17.
Upper Helderberg: Walpole, Ontario.

Trematopora ?? vesiculosa Winchell—Continued.

1870. Trematopora ? vesiculosa. Winchell, Proc. American Phil. Soc., XI, p
Burlington: Burlington, Iowa.
Waverly: Sciotoville, Ohio; Hillsdale, Michigan.

Trematopora whitfieldi Ulrich.

1883. Trematopora whitfieldi. Ulrich, Jour. Cincinnati Soc. Nat. Hist., p. 262, pl. xiii, 4, 4*a*.
Niagara: Waldron, Indiana.

TRIGONODICTYA Ulrich. Genotype: Pachydictya conciliatrix Ul

1893. Trigonodictya. Ulrich, Geol. Minnesota, III, p. 160.

Trigonodictya conciliatrix (Ulrich).

1886. Pachydictya conciliatrix. Ulrich, Fourteenth Ann. Rep. Geol. Nat. Sur. Minnesota, p. 76.
1893. Trigonodictya conciliatrix. Ulrich, Geol. Minnesota, III, p. 160, pl. i 12, pl. x, 15–20.
Trenton (Black River): Cannon Falls, Minnesota.

Trigonodictya eatonensis Ulrich.

1893. Trigonodictya eatonensis. Ulrich, Geol. Minnesota, III, p. 160.
1895. Trigonodictya eatonensis. Foerste, Geol. Sur. Ohio, VII, p. 599.
Clinton: Eaton, Ohio.

TROPIDOPORA Hall and Simpson. Genotype: Tropidopora nana

1887. Tropidopora. Hall and Simpson, Pal. New York, VI, p. xv.
1889. Tropidopora. Miller, North American Geol. Pal., p. 329.
1897. Tropidopora. Simpson, Fourteenth Ann. Rep. State Geologist New for the year 1894, p. 553.

Tropidopora nana Hall.

1886. Tropidopora nana. Hall, Fifth Ann. Rep. State Geologist New Yo the year 1885, pl. xxv, 25, 26.
1887. Tropidopora nana. Hall and Simpson, Pal. New York, VI, p. 71, pl. 25, 26.
1897. Tropidopora nana. Simpson, Fourteenth Ann. Rep. State Geologist York for the year 1894, pl. xvi, 1, 2.
Upper Helderberg: Onondaga Valley, New York.

Tuberculopora Ringueberg. Bryozoan? Genotype: Tuberculo inflata Ringueberg.

1886. Tuberculopora. Ringueberg, Bull. Buffalo Soc. Nat. Sci., V, p. 21.

Tuberculopora inflata Ringueberg. Not recognizable.

1886. Tuberculopora inflata. Ringueberg, Bull. Buffalo Soc. Nat. Sci., V, pl. ii, 18.
Niagara: Lockport, New York.

UNITRYPA Hall. Genotype: Fenestella (Hemitrypa) lata Hall.

1885. Unitrypa. Hall, Rep. State Geologist New York for the year 1884,
1886. Unitrypa. Ulrich, Contr. American Pal., I, p. 4.
1887. Unitrypa. Hall and Simpson, Pal. New York, VI, p. xxiii.
1889. Unitrypa. Miller, North American Geol. Pal., p. 329.
1890. Unitrypa. Ulrich, Geol. Sur. Illinois, VIII, p. 396.
1895. Unitrypa. Simpson, Thirteenth Ann. Rep. State Geologist New Yor the year 1893, pp. 689, 708, 726; Forty-seventh Ann. Rep. New State Museum, pp. 883, 902, 920.

UNITRYPA Hall—Continued.

1897. Unitrypa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pp. 508, 520.

1899. Unitrypa. Grabau, Bull. Buffalo Soc. Nat. Sci., VI, p. 161.

Unitrypa acaulis (Hall).

1883. Fenestella (Hemitrypa) acaulis. Hall, Trans. Albany Institute, X, p. 175 (abstract, 1881, p. 33).

1886. Fenestella (Unitrypa) acaulis. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. li, 1–6.

1887. Fenestella (Unitrypa) acaulis. Hall and Simpson, Pal. New York, VI, p. 131, pl. li, 1–6.

1886. Unitrypa conferta. Ulrich, Contr. American Pal., I, p. 17, pl. i, 8, 8*a*.

1887. Fenestella (Unitrypa) projecta. Hall and Simpson, Pal. New York, VI, p. 132.

1888. Fenestella (Unitrypa) projecta. Hall, Seventh Ann. Rep. State Geologist New York for the year 1887, pl. xiv, 6–8; Forty-first Ann. Rep. New York State Museum, pl. xiv, 6–8.

Hamilton: Falls of the Ohio.

Unitrypa acaulis-inclinis (Hall and Simpson).

1887. Fenestella (Unitrypa) acaulis var. inclinis. Hall and Simpson, Pal. New York, VI, p. 132.

Hamilton: Falls of the Ohio.

Obs. The differences between this form and Unitrypa acaulis are scarcely of varietal importance.

Unitrypa acclivis (Hall and Simpson).

1887. Fenestella (Unitrypa) acclivis. Hall and Simpson, Pal. New York, VI, p. 138, pl. lii, 16–23.

1897. Unitrypa acclivis. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. v, 15.

Upper Helderberg: Walpole, Ontario.

Unitrypa anonyma (Hall).

1883. Fenestella (Hemitrypa) anonyma. Hall, Trans. Albany Institute, X, p. 176 (abstract, 1881, p. 34).

Hamilton: Falls of the Ohio.

Unitrypa conferta Ulrich. See Unitrypa acaulis (Hall).

Unitrypa connexa Simpson.

1897. Unitrypa connexa Hall. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, pl. v, 12–14.

Obs. Simpson ascribes this species to Hall, but we have been unable to find it in any of Hall's works. The species apparently has not yet been described; until described the name is invalid.

Unitrypa ? elegantissima (Hall).

1883. Fenestella (Hemitrypa) elegantissima. Hall, Trans. Albany Institute, X, p. 177 (abstract, 1881, p. 35).

1886. Fenestella (Unitrypa) elegantissima. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. liii, 12–17.

1887. Fenestella (Unitrypa) elegantissima. Hall and Simpson, Pal. New York, VI, p. 140, p. liii, 12–17.

Upper Helderberg: Walpole, Ontario.

Unitrypa tegulata (Hall)—Continued.

1886. Fenestella (Unitrypa) stipata. Hall, Fifth Ann. Rep. State Geologist New York for the year 1885, pl. li, 7-14.
1887. Fenestella (Unitrypa) stipata. Hall and Simpson, Pal. New York, VI, p. 134, pl. li, 7-14.
1886. Unitrypa retrorsa. Ulrich, Contr. American Pal., I, p. 15, pl. i, 7-7*c*.
1887. Fenestella (Unitrypa) transversa. Hall and Simpson, Pal. New York, VI, p. 132.
1888. Fenestella (Unitrypa) transversa. Hall, Seventh Ann. Rep. State Geologist New York for the year 1887, pl. xiv, 9; Forty-first Ann. Rep. New York State Museum, pl. xiv, 9.
Hamilton: Falls of the Ohio.

VINELLA Ulrich. Genotype: Vinella repens Ulrich.

1890. Vinella. Ulrich, Jour. Cincinnati Soc. Nat. Hist., XII, p. 173.
1892. Vinella. Miller, North American Geol. Pal., First Appendix, p. 685.
1893. Vinella. Ulrich, Geol. Minnesota, III, p. 112.
1897. Vinella. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 604.

Vinella radialis Ulrich.

1893. Vinella radialis. Ulrich, Geol. Minnesota, III, p. 113, fig. 8*b*.
Cincinnati (Lorraine): Cincinnati, Ohio.

Vinella radiciformis-conferta Ulrich.

1893. Vinella radiciformis var. conferta. Ulrich, Geol. Minnesota, III, p. 113, fig. 8*c*, *d*.
Niagara: Waldron, Indiana.

Vinella repens Ulrich.

1890. Vinella repens. Ulrich, Jour. Cincinnati Soc. Nat. Hist., XII, p. 174. fig. 1.
1893. Vinella repens. Ulrich, Geol. Minnesota, III, p. 114, pl. i, 1-5.
1897. Vinella repens. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, fig. 222 (p. 604).
Trenton (Black River): St. Paul, Minnesota.

WORTHENOPORA Ulrich. Genotype: Worthenopora spinosa Ulrich.

1890. Worthenopora. Geol. Sur. Illinois, VIII, p. 403.
1889. Worthenopora. (Ulrich, in press), Miller, North American Geol. Pal., p. 330.
1897. Worthenopora. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, p. 602.

Worthenopora spatulata (Prout).

1859. Flustra spatulata. Prout, Trans. St. Louis Acad. Sci., I, p. 446, pl. xvii, 2-2*c*.
1890. Worthenopora spatulata. Ulrich, Geol. Sur. Illinois, VIII, p. 670, pl. lxviii, 2, 2*a*.
1894. Worthenopora spatulata. Keyes, Missouri Geol. Sur., V, p. 36.
Warsaw: Warsaw, Illinois; Barretts Station, Missouri.

Worthenopora spinosa Ulrich.

1890. Worthenopora spinosa. Ulrich, Geol. Sur. Illinois, VIII, p. 669, pl. lxviii, 1-1*g*.
1894. Worthenopora spinosa. Keyes, Missouri Geol. Sur., V, p. 36.
1897. Worthenopora spinosa. Simpson, Fourteenth Ann. Rep. State Geologist New York for the year 1894, figs. 217-219 (p. 603).
Keokuk: Warsaw and Nauvoo, Illinois; Keokuk and Bentonsport, Iowa.

INDEX OF SPECIFIC NAMES.

abrupta—Batostomella.
—Monotrypella.
abruptus (Chætetes)—Monotrypella.
acaulis —Unitrypa.
acaulis-inclinis—Unitrypa.
acclivis—Unitrypa.
acervulosa—Fistulipora.
—Leptotrypa.
acmeum—Semicoscinium.
aculeata—Polypora.
aculeolata—Cœlocaulis.
acuminata—Escharopora.
acuta—Pachydictya.
—Ptilopora.
(Ptilodictya)—Pachydictya.
(Stictopora)—Pachydictya.
acuticosta—Fenestella.
adherens—Stenopora.
adnata—Hederella.
—Reteporidra.
(Fenestella)—Reteporidra.
(Nicholsonia)—Hederella.
adornata—Fenestella.
adraste—Fenestella.
æqualis—Fenestella.
—Monotrypella.
(Monticulipora)—Monotrypella.
aequidistans—Chætetes.
æsyle—Fenestella.
affinis—Heterotrypa.
—Prasopora.
(Amplexopora)—Heterotrypa.
(Monticulipora)—Heterotrypa.
agellus—Ceramopora confluens.
albida—Fenestella.
albida-richfieldensis—Fenestella richfieldensis.
albionensis—Polypora.
alcicornis—Bythopora.
—Clathropora.
alcyone—Pachydictya.
alternata—Fistulipora.
—Hederella.
—Helopora.
—Nematopora.
—Stictopora.
(Ceramopora)—Cœloclema.
alternata (Lichenalia)—Fistulipora.
(Monticulipora)—Cœloclema.
(Stomatopora)—Hederella.
(Trematopora)—Acanthoclema.
alternatum—Acanthoclema.
—Cœloclema.
althæa—Fenestella.
alveata (Lichenalia)—Buskopora bistriata.
ambigua—Loculipora.
—Sagenella.
(Fenestella)—Loculipora.
(Isotrypa)—Loculipora.
americana—Acanthocladia.
—Cystodictya.
—Stenopora.
—Trematopora.
americana-varsoviensis—Stenopora.
ampla—Callopora.
amplectens—Monotrypa.
(Paleschara)—Leptotrypa quadrangularis.
amplexa—Streblotrypa.
anastomosa—Omniretepora.
anceps—Acanthocladia americana.
andrewsi—Callopora.
angulare—Arthroclema.
angularis—Callopora.
—Cystodictya.
—Escharopora.
—Stenopora.
—Stictoporella.
(Stictopora)—Cystodictya.
angularis-intermedia—Stictoporella.
angulata—Fenestella.
—Nicholsonia.
—Phylloporina.
(Retepora)—Phylloporina.
(Subretepora)—Phylloporina.
angusta—Cystodictya.
—Ptilodictya.
(Escharopora)—Ptilodictya.
angustata—Fenestella.
—Rhombopora.
annulata—Trematella.
annulata-pronaspina—Trematella annulata.

annulifera—Lioclemella.
anonyma—Unitrypa.
antheloidea—Stellipora.
(Constellaria) — Constellaria constellata.
(Hellipora)—Constellaria constellata.
(Stellipora)—Constellaria constellata.
anticorum—Gorgonia.
antiqua (Ptilodictya)—Eurydictya multipora.
aperta—Fenestella.
—Meekopora.
appressa—Dekayia.
—Eridotrypa.
(Monotrypella)—Eridotrypa.
approximata—Meekopora.
—Polypora.
—Scalaripora.
(Helopora) — Bythopora parvula.
approximatus (Chætetes)—Callopora dalei.
(Monticulipora)—Callopora dalei.
arachnoidea—Stomatopora.
araneum—Lioclema.
arborea—Monticulipora.
—Trematella.
(Trematopora)—Trematella.
arbuscula—Homotrypa.
arbuscula—Monotrypella.
arbusculus (Chætetes)—Monotrypella.
archimedes (Retepora)—Archimedes wortheni.
archimediformis (Helicopora)—Archimedes laxus.
arcolata (Monticulipora) — Aspidopora areolata.
arctipora—Bythopora.
areolata—Aspidopora.
—Spatiopora.
arguta—Pachydictya crassa.
arkonensis—Fenestella.
—Polypora.
armata—Helopora.
—Rhombopora.
armatum—Arthroclema.
arta—Polypora.
ascuta—Thamnicella.
aspectans—Polypora.
aspectus (Fenestella)—Polypora aspectans.
aspera—Batostomella.
—Dekayia.
—Hemitrypa.
—Phyllopora.
—Phylloporina.
—Spatiopora.
(Callopora)—Lioclema.
(Gorgonia)—Phylloporina.
(Lichenotrypa)—Lichenotrypa longispina.
(Monticulipora)—Spatiopora.
(Monticulipora (Dekayia))—Dekayia.
(Paleschara) — Paleschara maculata.
(Subretepora)—Phylloporina.
(Trematopora)—Batostomella.
asperato-striata—Phylloporina.
asperum—Lioclema.
asperrima (Rhombopora)—Rhombopora asperula.
asperula—Petigopora.
—Rhombopora.
(Monticulipora)—Petigopora.
assita—Fenestella.
asteria—Fistulipora.
asterias (Coscinium)—Fistulipora.
astrica—Fistulipora.
astricta—Fistulipora astrica.
attenuata—Rhombopora.
attrita (Dekayia)—Dekayia aspera.
attritus (Chætetes)—Dekayia aspera.
auloporoides—Proboscina.
banyana—Fenestella.
barrandei—Heterotrypa.
barrisi—Euspilopora.
basalis—Intrapora.
—Rhinidictya.
(Stictopora)—Rhinidictya.
(Stictoporella)—Intrapora.
beani—Paleschara.
bellistriata—Fenestella.
bellula—Helopora.
—Pinnatopora.
biarmica (Polypora)—Polypora biseriata.
bicornis—Fenestella.
bifaria (Isotrypa)—Isotrypa conjunctiva.
bifolia—Heliotrypa.
bifoliata—Ptilodictya nebulosa.
bifurca—Ptiloporella.
bifurcata—Arthropora.
—Cystodictya.
—Diploporaria.
—Fenestella.

bifurcata—Pachydictya.
(Eschara)—Pachydictya.
(Stictopora)—Cystodictya.
bifurcata-instabilis—Pachydictya.
bigeneris—Fenestella perplexa.
biimbricatum—Semicoscinium.
bilateralis—Goniotrypa.
—Paleschara.
billingsi—Arthroclema.
—Monticulipora.
biperforata—Fenestrapora.
(Tectulipora)—Loculipora loculata.
bipunctata (Callopora)—Streblotrypa.
(Ptilodictya)—Phænopora expansa.
biordo—Hemitrypa.
biserialis—Diploporaria.
—Hemitrypa.
—Septopora.
(Fenestella)—Hemitrypa.
(Synocladia)—Septopora.
biserialis-exilis—Hemitrypa.
biserialis-gracilis—Septopora.
biserialis-nervata—Septopora.
biseriata—Fenestella.
biserrulatum—Semicoscinium.
bispinulata—Orthopora.
(Callopora)—Orthopora.
(Trematopora)—Streblotrypa.
bispinulatum (Acanthoclema)—Orthopora.
bistigmata—Semiopora.
bistriata—Buskopora.
blandida—Polypora.
briarea (Monticulipora)—Eridotrypa.
(Monotrypella)—Eridotrypa.
briareus—Eridotrypa.
—Escharopora.
(Chætetes)—Eridotrypa.
(Ptilodictya)—Escharopora.
brevilinea (Fenestella)—Semicoscinium exornatum.
brevisulcata—Polypora.
bristolensis (Stictopora)—Cystodictya bifurcata.
bulbosa—Stenopora.
bullata—Fistulipora.
burlingtonensis—Fenestella.
—Polypora.
calceola—Leptotrypa.
calhounensis—Eurydictya.
calloporoides—Trematopora.
callosa—Homotrypa.
calycula—Aspidopora.
calyculus (Chætetes)—Aspidopora.
camerata—Chilotrypa.
canadense—Batostoma.
canadensis—Fistulipora.
—Hederella.
—Ptilodictya.
—Scalaripora.
—Stomatopora.
(Alecto)—Hederella.
(Amplexopora)—Batostoma.
(Aulopora)—Hederella.
(Nicholsonia)—Hederella.
canaliculata—Orthopora.
cannonensis—Monticulipora.
carbaseoides—Flustra.
carbonaria—Cystodictya.
—Fistulipora.
—Stenopora.
(Ptilodictya)—Cystodictya.
carbonaria-conferta—Stenopora.
carbonaria-maculosa—Stenopora.
carbonarius (Chætetes)—Stenopora.
carinata—Lichenalia.
—Orthopora.
—Pinnatopora.
(Clathropora)—Coscinium cribriforme.
(Coscinotrypa)—Coscinium cribriforme.
(Glauconome)—Pinnatopora.
(Trematopora)—Orthopora.
carinella—Polypora.
cavernosa—Fenestella.
(Lichenotrypa)—Lichenotrypa longispina.
cellulosum—Lioclema.
celsipora—Polypora.
celsipora-minima—Polypora.
celsipora-minor—Polypora.
cervicornis—Callopora.
cestriensis—Fenestella.
—Polypora.
—Septopora.
—Stenopora.
(Septopora) (M. & W.)—Septopora subquadrans.
cincinnatiensis—Monticulipora.
(Callopora)—Lioclema occidens.
(Chætetes)—Monticulipora.
(Ptilodictya)—Arthropora shafferi-cleavelandi.

cinctosum—Mitoclema.
cinctura (Lyropora)—Reteporidra cinctuta.
cinctuta—Reteporidra.
cingulata—Amplexopora.
—Fenestella.
—Tæniodictya.
circe—Helopora.
circincta—Selenopora.
circularis—Calloporella.
circumstata—Loculipora.
cirrhosa—Hederella.
cisseis—Drymotrypa.
clathrata—Fenestella.
—Phylloporina.
(Intricaria)—Phylloporina.
(Subretepora)—Phylloporina.
clathratula (Stictopora)—Escharopora pavonia.
clathratulus (Chætetes)—Escharopora pavonia.
clausa—Meekopora.
clavacoidea—Leptotrypa.
claviformis—Leptotrypa.
—Stictoporina.
(Stictopora)—Stictoporina.
(Trematopora)—Stictoporina.
clavis—Leptotrypa.
cleavelandi—Monticulipora.
cleia—Fenestella.
cleis—Semicoscinium.
clintonensis—Monticulipora.
(Clathropora)—Clathropora frondosa-clintonensis.
(Ptilodictya)—Ptilodictya nodosa.
clintonii—Retepora.
clivulata—Eridopora.
clypeiformis—Ceramopora.
coalescens—Chilotrypa.
—Reteporina.
(Fenestella)—Reteporina.
(Trematopora)—Chilotrypa.
colliculata—Fistulipora.
—Monotrypa.
(Lichenalia)—Fistulipora.
colliculatus (Chætetes)—Monotrypa.
collina—Cyclotrypa.
columelliata—Hemitrypa.
columnaris—Chætetes.
communis—Archimedes.
—Cyclotrypa.
(Diamesopora)—Cœloclema concentricum.
communis (Fistulipora)—Cyclotrypa.
(Monticulipora)—Callopora onealli-communis.
compacta—Fenestralia.
—Polypora.
(Fenestella)—Polypora.
compactus—Archimedes.
complanata—Polypora.
complexa—Selenopora.
complexata—Selenopora complexa.
compressa—Fenestella.
—Fistulipora.
—Peronopora.
—Petalotrypa.
—Polypora.
(Fenestella) (Hall)—Polypora.
(Monticulipora)—Peronopora.
(Stictopora)—Phænopora magna.
compressa-nododorsalis—Fenestella nododorsalis.
compressus (Chætetes)—Peronopora.
concava—Helopora.
concentrica—Cystodictya.
—Lichenalia.
—Paleschara.
(Ceramopora)—Cœloclema.
(Eschara)—Cystodictya.
(Lichenotrypa)—Fistulipora neglecta.
concentrica-maculata—Fistulipora neglecta-maculata.
concentrica-parvula—Fistulipora halli.
concentricum—Cœloclema.
conciliatrix—Trigonodictya.
conferta—Hederella.
—Nematopora.
—Pinnatopora.
—Polypora.
(Fenestella)—Polypora.
(Ptilionella)—Hederella.
(Unitrypa)—Unitrypa acaulis.
confertipora (Fenestella)—Ptiloporella bifurca.
(Fistulipora)—Lioclema.
(Fistuliporina)—Lioclema.
(Thallostigma)—Lioclema.
confertiporum—Lioclema.
confluens—Acanthoclema.
—Ceramopora.
—Escharopora.
—Homotrypa.
(Monotrypella)—Homotrypa.
(Rhombopora)—Acanthoclema.

confusa—Fistulipora.
  —Proboscina.
  (Alecto)—Proboscina.
  (Lichenalia)—Fistulipora.
confusa (Stomatopora)—Proboscina.
conica—Ptiloporina.
conjunctiva—Isotrypa.
conjunctus—Arthrostylus.
connexa—Unitrypa.
conoidea—Prasopora.
conradi—Fenestella.
consimilis—Isotrypa.
  —Monotrypella.
  (Chætetes)—Monotrypella.
  (Fenestella)—Isotrypa.
  (Monticulipora)—Monticulipora lævis-consimilis.
  (Tectuliporella)—Isotrypa.
constellata—Constellaria.
  —Phænopora.
  (Ceriopora)—Constellaria.
constellata-plana—Constellaria.
constellata-prominens—Constellaria.
constellatus (Chætetes)—Constellaria.
constricta—Chilotrypa.
  —Fistulipora.
  —Phacelopora.
  (Diamesopora)—Chilotrypa.
  (Fistuliporella)—Fistulipora.
  (Lichenalia)—Fistulipora.
  (Trematopora)—Chilotrypa.
contexta—Homotrypella.
contigua—Prasopora.
conulata—Fistulipora.
cornuta—Fistulipora.
cornutum—Arthroclema.
coronis—Semicoscinium.
corrugata—Fistulipora.
cortex—Leptotrypa.
corticans—Spatiopora.
corticata—Fenestella.
corticosa—Eridotrypa.
  —Phylloporina.
  —Polypora.
  (Chætetes)—Eridotrypa.
  (Phyllopora)—Phylloporina.
  (Subretepora)—Phylloporina.
  (Trematopora)—Eridotrypa.
cosciniformis—Coscinella.
crassa—Atactoporella.
  —Fistulipora.
  —Pachydictya.
  —Polypora.
  —Rhombopora.
crassa (Fistulipora) (Rom.)—Fistulipora romingeri.
  (Lichenalia)—Fistulipora.
  (Ptilodictya)—Pachydictya.
  (Stictopora)—Pachydictya.
  (Trematopora)—Fistulipora.
crassimuralis—Monotrypella.
crebripora—Fenestella.
  —Trematopora.
crebriramus—Chætetes.
crenulata—Callopora.
  (Cystodictya)—Cystodictya subrigida.
  (Stictopora)—Cystodictya subrigida.
crebescens—Polypora.
crescens—Cystodictya.
cribriforme—Coscinium.
cribriformis-carinata (Coscinotrypa)—Coscinium cribriforme.
cribrosa—Fenestella.
  —Hemitrypa.
  —Stictoporella.
  (Fenestella) (Hall)—Hemitrypa.
  (Fenestella) (Nich.)—Fenestella nicholsoni.
crispata—Cystodictya gilberti.
cristata—Phractopora.
cristata-lineata—Phractopora cristata.
cruciformis (Ptilodictya)—Escharopora falciformis.
crustacea—Lichenalia.
crustulata (Monticulipora)—Chætetes.
crustulatus—Chætetes.
cultellata—Fistulipora.
  (Fenestella)—Polypora shumardi.
  (Lichenalia)—Fistulipora.
  (Polypora)—Polypora shumardi.
cultrata—Fenestella.
cumulata—Monotrypa.
  —Nicholsonella.
  (Monticulipora)—Nicholsonella.
curtus—Arthrostylus.
curvata—Bactropora.
  —Fenestella.
  —Homotrypa.
  —Pinnatopora.
  (Monticulipora)—Homotrypa.
  (Rhinopora)—Rhinopora verrucosa.
curvijunctura—Fenestella.

cyclops (Coscinium)—Clathropora intertexta.
cylindracea—Polypora.
—Ptilopora.
(Fenestella)—Polypora.
dalei—Callopora.
dalii (White)—Monticulipora.
(Monticulipora) (Hall)—Callopora ramosa.
davidsoni—Semicoscinium.
dawsoni—Homotrypa.
—Phylloporina.
(Monticulipora)—Homotrypa.
(Subretepora)—Phylloporina.
debilis—Trematopora.
decipiens—Batostoma.
—Lioclema.
—Peronopora.
—Rhombopora.
—Septopora.
(Chætetes)—Peronopora.
(Fistulipora)—Lioclema.
(Thallostigma)—Lioclema.
delicata—Fenestella.
—Petalotrypa.
delicatula—Bythopora.
—Fenestella.
—Nematopora.
—Septopora.
—Stomatopora.
(Hippothoa)—Stomatopora.
(Monticulipora)—Bythopora.
delicatula-tenuissima—Stomatopora.
delicatulus (Chætetes)—Bythopora.
dendrina—Bythopora.
densa—Monotrypella.
(Fistulipora)—Lioclema.
(Thallostigma)—Lioclema.
(Trematopora)—Monotrypella.
densus (Chætetes)—Monotrypella.
densum—Lioclema.
dentata—Buskopora.
denticulata—Eridopora.
—Streblotrypa.
(Lichenalia)—Eridopora.
(Pileotrypa)—Eridopora.
depressa—Fenestella.
dermata—Strotopora.
devonica—Dekayia.
—Discotrypa.
dichotoma—Diamesopora.
—Drymotrypa.
—Rhombopora.
(Hornera)—Thamniscus
dichotoma (Stictopora)—Tæniopora subcarinata.
(Subretepora)—Thamniscus.
dichotomus—Thamniscus.
dictyotum—Coscinium.
diffusa—Drymotrypa.
digitatum—Lioclema.
dilata—Fenestella.
(Prismopora)—Prismopora dilatata.
dilatata—Prismopora.
discoidea—Amplexopora.
—Mesotrypa.
—Proutella.
(Cyclopora)—Proutella.
(Leptotrypa)—Amplexopora.
(Monticulipora)—Amplexopora.
discoideus (Chætetes)—Amplexopora.
dispanda—Fenestella.
disparilis—Ptiloporina.
dispersa—Chilotrypa.
dissimilis—Paleschara.
distans—Archimedes.
—Fistulipora.
—Polypora.
(Fenestella)—Polypora.
(Lichenalia)—Fistulipora.
distensa—Fistulipora.
distincta—Ceramoporella.
—Polypora.
—Streblotrypa.
distorta (Escharina)—Rhinopora verrucosa.
divaricans—Thamniscus.
divaricata—Helopora.
—Thamnotrypa.
(Thamnopora)—Thamnotrypa.
divergens—Acanthoclema.
—Lyropora.
—Stictopora.
diversa—Callopora.
dubia—Diplotrypa.
(Hemitrypa)—Loculipora ambigua.
(Monticulipora)—Diplotrypa.
(Ptilodictya)—Arthropora shafferi-cleavelandi.
dumalis—Callopora.
dumosa—Stictoporella.
duogeneris—Tæniopora exigua.
dychei—Leptotrypa.
eatonensis—Trigonodictya.
eccentrica—Aspidopora.

echinata—Eridotrypa.
egenus—Chætetes.
ehrenbergi—Phyllopora.
elegans—Berenicea.
—Dichotrypa.
—Discotrypa.
—Fenestella.
—Glyptopora.
—Helopora.
—Pachydictya.
—Pinacotrypa.
(Chætetes)—Discotrypa.
(Coscinium)—Glyptopora.
(Fistulipora)—Pinacotrypa.
(Monticulipora)—Discotrypa.
(Polypora)—Polypora idothea.
(Sagenella)—Berenicea.
elegantissima—Unitrypa.
elegantula—Aspidopora.
—Callopora.
—Coscinella.
—Intrapora.
—Rhombopora.
—Stictopora.
(Anisotrypa)—Rhombopora.
elevatipora—Fenestella.
elongata—Orthopora.
—Polypora.
(Fenestella)—Polypora.
(Trematopora)—Orthopora.
emacerata—Dicranopora.
emarcescens—Ptilodictya expansa-emarcescens.
emaciata—Fenestella.
—Pachydictya.
—Stenopora.
ensiformis—Phænopora.
epidermata—Bythotrypa.
erecta (Crateripora)—Arthropora shafferi.
erectipora—Fenestella.
eriense—Semicoscinium.
eriensis—Fistulipora.
escharense—Coscinium.
eudora—Polypora.
(Fenestella)—Polypora.
(Fenestella) (Hall, 1883)—Polypora stricta.
everetti—Pachydictya.
excellens—Fistulipora.
—Phænopora.
(Ptilodictya)—Phænopora.
(Stictoporella)—Phænopora.
exigua—Eridotrypa.
exigua—Fenestella.
—Protocrisina.
—Rhinidictya.
—Rhombopora.
—Stictoporella.
—Tæniopora.
exilis—Homotrypa.
—Rhombopora.
(Stenopora)—Rhombopora.
eximia—Fenestella.
—Meekopora.
exornatum—Semicoscinium.
expansa—Ceramopora.
—Phænopora.
—Ptilodictya.
(Alveolites)—Ceramopora.
(Ptilodictya)—Phænopora.
expansa-emarcescens—Ptilodictya.
expansus—Chætetes.
expatiata—Cyclopora.
—Dichotrypa.
explanata—Ceramopora.
—Phænopora.
explicans—Ptilodictya.
exsul—Lioclema.
facula—Sceptropora.
falcata—Limaria.
falciformis—Escharopora.
falesi—Monticulipora.
famelica—Pachydictya.
farctus (Ptilodictya)—Pachydictya.
fasciculata—Clonopora.
fastigata—Unitrypa.
fastuosa—Polypora.
favosa—Hemitrypa.
fenestelliformis—Pachydictya.
fenestelliformis-corticula—Pachydictya.
fenestrata—Phylloporina.
—Rhinidictya.
(Retepora)—Drymotrypa.
(Stictopora)—Rhinidictya.
(Sulcopora)—Rhinidictya.
(Subretepora)—Phylloporina.
fertile—Batostoma.
fertile-circulare—Batostoma.
fibrosa—Stenopora.
fibrosus—Nemataxis.
ficticia—Unitrypa.
fidelis—Rhinidictya.
filiasus—Amplexopora filiosa.
filiosa—Amplexopora.
filiformis—Fenestella.
—Hederella.
(Aulopora)—Hederella.

filistriata—Fenestella.
filitexta—Fenestella.
fimbriata—Pachydictya.
—Phænopora.
(Ptilodictya)—Phænopora.
firma—Pachydictya.
fischeri—Constellaria.
fistulata—Polypora.
—Anisotrypa.
fistulosa (Callopora)—Lioclema cellulosum.
flabellaris—Homotrypa.
flabellata—Diastoporina.
—Stictoporella.
(Chiloporella)—Chiloporella nicholsoni.
(Clathropora)—Stictoporella.
(Fistulipora)—Chiloporella nicholsoni.
flabelliformis—Polypora.
flabellum—Dichotrypa.
flagellum—Ptilodictya.
flexuosa—Pinnatopora.
—Retepora.
—Reteporina.
—Stictoporella.
(Fenestella)—Reteporina.
(Ptilodictya)—Stictoporella.
fletcheri—Dekayella ulrichi.
fletscheri—Dekayella ulrichi.
florida (Callopora)—Lioclema.
(Constellaria)—Constellaria constellata.
florida-plana—Constellaria constellata-plana.
florida-prominens—Constellaria constellata-prominens.
floridum—Lioclema.
foliacea—Fistulipora.
—Meekopora.
—Retepora.
(Ceramopora)—Meekopora.
(Lichenalia)—Fistulipora.
foliata—Dichotrypa.
—Fenestella.
—Pachydictya.
(Paleschara)—Ptilodictya nebulosa.
foliatum—Lioclema.
foordi—Fistulipora.
formosa—Nematopora.
foveolata—Strotopora.
fungia—Cyclopora.
funicula—Fenestella.
furcatus—Chætetes.
furcillatus—Thamniscus.
fusiforme—Ascodictyon.
fusiformis—Lioclemella.
(Chætetes)—Lioclemella.
(Monticulipora)—Lioclemella subfusiformis.
fustiformis—Sceptropora.
fragilis—Dicranopora.
—Helopora.
—Nematopora.
—Trematopora.
(Ptilodictya)—Dicranopora.
(Stictopora)—Dicranopora.
fragilis-acadiensis—Helopora.
frequens—Fenestella.
frondifera—Stictoporella.
frondosa—Ceramophylla.
—Clathropora.
—Heterotrypa.
—Phyllodictya.
—Proboscina.
—Tæniodictya.
(Alecto)—Proboscina.
(Aulopora)—Proboscina.
(Monticulipora)—Heterotrypa.
(Monticulipora) (Nich., J. & J.)—Peronopora decipiens.
(Rhinopora)—Rhinopora verrucosa.
(Stomatopora)—Proboscina.
frondosa-clintonensis—Clathropora.
frondosus (Chætetes)—Heterotrypa.
(Chætetes) (Nich.)—Peronopora decipiens.
frondosus limatus (Chætetes)—Heterotrypa frondosa.
fruticellus—Thamniscus.
fruticosa—Acanthocladia.
—Stictopora.
(Bythopora)—Bythopora dendrina.
(Monotrypa)—Chætetes.
fruticosus (Hamilton)—Chætetes.
(Lower Helderberg)—Monotrypella arbuscula.
furcatus—Chætetes.
gelasinosa—Homotrypa.
geniculata—Callotrypa.
—Cystopora.
(Callopora)—Callotrypa.
geometrica—Fistulipora.
gigantea—Pachydictya.
—Ptilodictya.

gigantea (Heterodictya)—Ptilodictya.
gilberti—Cystodictya.
gladiola—Ptilodictya.
glomerata—Stictopora.
—Trematella.
(Trematopora)—Trematella.
goodhuensis—Callopora.
gracilis—Bythopora.
—Clathropora.
—Phylloporina.
—Polypora.
—Rhombopora.
(Batostomella)—Bythopora.
(Chætetes)—Bythopora.
(Homotrypella)—Bythopora.
(Monticulipora)—Bythopora.
(Retepora)—Phylloporina.
(Subretepora)—Phylloporina.
gracillimum—Lioclema.
grahami—Arthropora shafferi-cleavelandi.
graminifolia—Stictopora.
granatula—Stictopora.
grandis—Archimedes.
—Dichotrypa.
—Evactinopora.
—Prasopora.
—Rhinidictya.
(Monticulipora)—Prasopora.
granifera—Fistulipora.
—Orthopora.
—Stictopora.
(Fenestella)—Semicoscinium.
(Lichenalia)—Fistulipora.
(Pileotrypa)—Fistulipora.
(Trematopora)—Orthopora.
graniferum—Semicoscinium.
granilinea—Orthopora.
—Polypora.
(Fenestella)—Polypora.
(Trematopora)—Orthopora.
granistriata—Bactropora.
—Phylloporina.
(Trematopora)—Bactropora.
granosa—Nematopora.
granosus—Cœloconus.
granulata—Trematopora.
granulifera—Batostomella.
—Homotrypella.
(Batostomella)—Homotrypella.
(Monticulipora)—Homotrypella.
granulifera (Rhombopora)—Batostomella.
(Trematopora)—Batostomella.
granuliferus (Chætetes)—Homotrypella.
granulosa—Ceramoporella.
—Dicranopora.
—Fenestella.
(Ptilodictya)—Rhinidictya.
(Rhinidictya)—Dicranopora.
granulosa-milfordensis—Ceramoporella.
gregaria—Petigopora.
halli—Fistulipora.
—Phylloporina.
—Trematopora.
halliana—Polypora.
hamiltonense—Monticulipora winchelli.
hamiltonensis—Chætetes.
—Cystodictya.
—Reteporina.
—Streblotrypa.
(Callopora)—Streblotrypa.
(Ceriopora)—Streblotrypa.
(Polypora)—Reteporina.
(Retepora)—Reteporina.
(Rhombopora)—Streblotrypa.
hamiltoniana—Polypora.
harrisi—Helopora.
(Calloporella)—Calloporella circularis.
helderbergiæ—Monotrypa.
helios—Fistulipora.
hemicycla—Semicoscinium labiatum.
hemispherica—Crepipora.
—Fistulipora.
(Callopora)—Fistulipora.
hemisphericus (Thecostegites)—Fistulipora.
hemitrypa—Hemitrypa proutana.
herrickana—Fenestella.
herricki—Bythopora.
hertzeri—Streblotrypa.
hestia—Fenestella.
heteropora—Callotrypa.
hexagona—Orthopora.
hexagonalis—Leptotrypa.
—Pachydictya.
—Polypora.
(Fenestella)—Polypora.
hexagonalis-foraminulosa—Polypora.
hilli—Escharopora.
hindei—Semicoscinium.

hirsuta—Atactopora.
hispida—Chilotrypa.
hospitalis—Prasopora.
hopitalis-lævis—Monticulipora lævis.
hospitalis-neglecta—Prasopora hospitalis.
humifusa—Hernodia.
humile—Batostoma.
humilis—Chætetes.
(Rhinidictya)—Pachydictya.
huronensis—Fistulipora.
—Stenopora.
(Ceramopora)—Fistulipora.
hyale—Cœlocaulis.
idalia—Fenestella.
idothea—Polypora.
imbricata—Ceramopora.
—Helopora.
—Polypora.
(Cœloclema)—Diamesopora.
imbricella—Ceramopora.
immersa—Orthopora.
imperfectum—Hemiphragma.
implicatum—Batostoma.
impolita—Anolotichia.
impressa—Crepipora.
—Polypora.
inæqualis—Fenestella.
—Ptiloporella.
(Fenestella)—Ptiloporella.
incerta—Monotrypa.
—Phylloporina.
—Polypora.
(Retepora)—Phylloporina.
(Subretepora)—Phylloporina.
incipiens—Phænopora.
incisurata—Cystodictya.
inclusa—Ceramoporella.
—Favicella.
(Thallostigma)—Favicella.
inclusapora—Favicella inclusa.
incompta—Monticulipora.
incongruens—Fenestella.
incontroversa—Callopora.
incrassata—Fistulipora.
—Paleschara.
—Rhombopora.
—Stictopora.
(Callopora)—Fistulipora.
(Cystodictya)—Stictopora.
incrustans—Ceramopora.
—Paleschara.
incurva—Clonopora.
indenta—Cystodictya.
inexpectans—Monotrypa helderbergiæ.
infida—Mesotrypa.
inflata—Stomatopora.
—Tuberculopora.
(Alecto)—Stomatopora.
(Hippothoa)—Stomatopora.
inflecta—Heterotrypa.
inflexum—Semicoscinium.
informis—Leptotrypa.
infraporosa—Fenestrapora.
infrequens—Diamesopora.
—Ptilopora.
(Cœloclema)—Diamesopora.
(Trematopora)—Diamesopora.
infundibuliformis—Gorgonia.
insignis—Homotrypa subramosa-insignis.
instabilis—Homotrypella.
insueta—Atactoporella.
—Berenicea.
insularis—Prasopora.
intabulata—Monotrypa.
interaspera—Fistulipora.
intercalaris—Homotrypa.
—Stenopora.
intercella—Paleschara.
intercellatum—Lioclema.
intermedia—Clathropora.
—Dichotrypa.
—Fenestella.
—Pinnatopora.
—Polypora.
intermedius—Archimedes.
intermittens—Stenopora.
internascens—Chætetes.
internodata—Callotrypa.
internodia—Dicranopora.
interplana—Orthopora.
interpolata—Tæniodictya.
interporosa—Ceramoporella.
interruptum—Semicoscinium.
interstincta—Batostomella.
(Stictoporella)—Stictoporella flexuosa.
interstriata—Stictopora.
intertexta—Clathropora.
invaginatus—Archimedes.
invertis—Cystodictya.
involvens—Lioclema.
iowensis—Spatiopora.
irrasum—Hemiphragma.
irregularis—Ceramoporella.
—Cœlocaulis.
—Helopora.
—Leptotrypa.
(Alveolites)—Ceramoporella.

irregularis (Callopora)—Cœlocaulis.
(Ceramopora)—Batostoma implicatum.
(Chætetes)—Leptotrypa.
(Monotrypa)—Leptotrypa.
(Monticulipora)—Leptotrypa.
(Trematopora)—Orthopora.
jamesi—Batostoma.
(Chætetes)—Batostoma.
jamesii (Cyclopora)—Escharopora pavonia.
juncea—Fenestella.
kentuckyensis—Monticulipora.
—Ptilodictya.
keyserlingi—Glyptopora.
labecula—Ceramopora confluens.
labeculoidea—Ceramopora.
labeculosa—Spatiopora.
labiatum—Semicoscinium.
labiosa—Fistulipora.
labyrinthica—Stictopora.
læviramus—Bythopora gracilis.
lævis—Monticulipora.
lævis-consimilis—Monticulipora.
lævistriata—Polypora.
lamellata—Fistulipora.
lamellosa—Monticulipora.
laminata—Nicholsonella.
—Lioclema.
laminatum—Lioclema.
lanceolata-americana—Ptilodictya expansa.
largior—Fenestrapora.
largissima—Polypora.
lata—Prismopora.
—Rhinidictya.
—Unitrypa.
(Dicranopora)—Rhinidictya.
(Fenestella)—Unitrypa.
laticarina—Fenestella.
laticrescens—Ptiloporella.
latijuncturum—Semicoscinium.
latispiralis—Helicopora.
latitruncata—Polypora.
latum—Coscinium.
laxa—Proboscina.
(Archimedes)—Archimedes owenanus.
(Fenestella)—Archimedes.
laxata—Bythotrypa.
laxum—Chainodictyon.
laxum-minor—Chainodictyon.
laxus—Archimedes.
lens—Calloporella.
lens (Fistulipora)—Calloporella.
(Monticulipora)—Calloporella circularis.
lenticularis—Prasopora.
lepidodendroides—Rhombopora.
levinodata—Polypora.
libana—Escharopora.
—Stenopora.
lichenoides—Ptilodictya.
(Stromatopora)—Arthropora shafferi.
lilæa—Polypora.
limata—Cystodictya.
limbata—Fenestella.
limbatus-remotus—Fenestella remota.
limitaris—Constellaria.
—Diplotrypa.
—Escharopora.
—Fenestella.
(Stellipora)—Constellaria.
lineanoda—Fenestella.
linearis—Cystodictya.
lineata—Cystodictya.
—Nematopora.
—Orthopora.
—Spatiopora.
(Crateripora)—Escharopora falciformis.
(Helopora)—Nematopora.
(Phractopora)—Phractopora cristata.
(Rhombopora)—Orthopora.
(Trematopora)—Orthopora.
lineata-expansa (Crateripora)—Escharopora falciformis.
lineata-incepta—Spatiopora.
lineata-major—Cystodictya.
lineata-sancti-ludovici—Cystodictya.
lineinodis—Rhombopora.
lineinodis-humilis—Rhombopora.
lineopora—Nematopora.
lirata—Phænopora.
lobata—Euspilopora.
loculata—Loculipora.
lodiensis—Fenestella.
longimacula—Fistulipora.
longispina—Lichenotrypa.
lunata—Buskopora.
(Fistulipora)—Buskopora.
(Lichenalia)—Buskopora dentata.
lunata-tubulata—Buskopora dentata.
lunulatum—Semicoscinium.
lycoperdon—Chætetes.

lycoperdon (Prasopora) — Prasopora simulatrix.
lycoperdon-selwyni—Prasopora.
lycopodites—Favosites.
    (Chætetes)—Chætetes lycoperdon.
lyelli—Fenestella.
lyra (Fenestella) — Lyropora subquadrans-lyra.
lyroides—Dichotrypa.
maccoyana—Polypora.
macropora—Callotrypa.
    —Nematopora.
    (Callopora)—Callotrypa.
    (Trematopora)—Nematopora.
macropora-signata—Callotrypa.
macrostoma—Eridopora.
maculata—Atactopora.
    —Ceramopora.
    —Dekayia.
    —Escharopora.
    —Paleschara.
    (Leptotrypa)—Paleschara.
    (Monticulipora)—Dekayia.
    (Ptilodictya)—Escharopora.
maculosa—Fistulipora.
    —Spatiopora.
    (Callopora)—Fistulipora.
    (Lichenalia)—Fistulipora.
    (Trematopora)—Fistulipora.
maculosa - incepta — Spatiopora lineata-incepta.
magna—Hederella.
    —Monotrypa.
    —Phænopora.
    (Stictopora)—Phænopora.
magnifica—Fenestella.
    —Ptilodictya.
magnipora—Pachydictya.
magnopora—Callopora.
magnoporum—Batostoma.
major—Streblotrypa.
mammillosa—Monticulipora molesta.
mammulata—Monticulipora.
    (Monticulipora) (Nich.)—Heterotrypa frondosa.
mammulatus (Quenstedt)—Chætetes.
    (Chætetes)—Monticulipora.
    —Heterotrypa frondosa.
mammulata-molesta — Monticulipora molesta.
manitobense—Batostoma.
manitobensis—Polypora.
marcida—Fenestella.
marginalis—Fenestella.
marginata—Pinacotrypa.
    (Polypora)—Polypora submarginata.
maxima—Ceramopora.
mediopora—Cœlocaulis
meekana—Fenestella.
    —Stenopora.
meekanus—Archimedes.
meeki—Cystodictya.
    —Bythopora.
    —Helopora.
    (Chætetes)—Bythopora.
    (Homotrypella)—Bythopora.
    (Monticulipora)—Bythopora.
    (Ptilodictya)—Cystodictya.
megastoma—Phractopora.
membranacea—Berenicea.
mexicana—Polypora.
michelinia—Glyptopora.
    (Phractopora)—Glyptopora sagenella-lata.
microporum—Lioclema.
microscopicus—Chætetes.
microtrema—Fenestella.
milfordensis — Ceramoporella granulosa-milfordensis.
milleri—Mesotrypa.
mimica—Fenestella.
minima—Leptotrypa.
    —Prismopora.
    —Rhinidictya.
    (Eridopora)—Eridopora denticulata.
minima-modesta—Rhinidictya.
minimus (Favosites)—Monotrypa spherica.
minnesotense—Batostoma.
minnesotensis—Berenicea.
    —Homotrypa.
minnesotensis-montifera—Homotrypa.
minor—Pinnatopora.
    —Rhombopora.
minuta—Nematopora.
    (Fistulipora)—Lioclema.
    (Trematopora)—Nematopora.
minutum—Lioclema.
minutus—Bythopora delicatula.
minutissimum—Lioclema.
mirabile—Semicoscinium.
missouriensis—Lioclema punctatum.
modesta—Fenestella.
molesta—Monticulipora.

moniliformis—Heterotrypa.
—Stomatopora.
(Amplexopora)—Heterotrypa.
(Chætetes)—Heterotrypa.
(Monticulipora)—Heterotrypa.
monticula—Monticulipora.
monticulata—Fistulipora.
—Monotrypa.
monticulatus (Chætetes)—Monotrypa.
montifera—Eurydictya.
—Spatiopora.
—Stenopora.
montuosum—Batostoma.
mucronata—Helopora.
multaculeatum—Lioclema.
multifida—Phænopora.
multigranosa—Atactoporella.
multiplex—Polypora.
multipora—Eurydictya.
—Rhombopora.
(Fistulipora)—Chiloporella nicholsoni.
(Phænopora)—Eurydictya.
(Stictopora)—Cystodictya incisurata.
multiporata—Homotrypella.
—Streblotrypa.
multiporata-lodiensis—Fenestella lodiensis.
multiramis—Ptilodictya.
multiramus—Thamniscus.
multispinosa—Dekayia.
—Fenestella.
multiseriata—Callotrypa.
multitabulata—Callopora.
multituberculata—Monotrypella quadrata.
mundula—Atactoporella.
—Homotrypella.
(Atactopora)—Atactoporella.
mundulum—Mitoclema.
muscatinensis—Chætetes.
mutabilis—Eridotrypa.
—Polypora.
—Rhinidictya.
(Fenestella)—Polypora.
(Stictopora)—Rhinidictya.
mutabilis-major—Rhinidictya.
mutabilis-minor—Eridotrypa.
(Stictopora)—Rhinidictya.
mutabilis-senilis—Rhinidictya.
nana—Tropidopora.
—Unitrypa.
(Fenestella)—Unitrypa.
nanus—Thamniscus.
nashvillensis—Rhinidictya.
nebulosa—Ptilodictya.
neglecta—Diplotrypa.
—Fistulipora.
—Rhinidictya.
neglecta-canadensis—Rhinidictya.
neglecta-maculata—Fistulipora.
negligens—Archimedes.
nereidis—Pinnatopora.
nereis—Ichthyorachis.
nervata—Ptiloporella.
nervia—Unitrypa.
nervia-constricta—Unitrypa.
newberryi—Aspidopora.
newportensis—Atactoporella.
nexa—Polypora.
nexilis—Fenestella.
(Alecto)—Batostoma implicatum.
niagarensis—Drymotrypa.
nicholsoni—Chiloporella.
—Fenestella.
—Rhinidictya.
(Ceramopora)—Chiloporella.
(Monticulipora)—Chiloporella.
nicklesi—Rhombopora.
—Streblotrypa.
nitida—Cystodictya.
—Lioclemella.
(Graptodictya)—Graptodictya perelegans.
(Trematopora)—Lioclemella.
nitidula—Batostomella.
—Dicranopora.
(Ptilodictya)—Dicranopora.
nodata—Pinnatopora.
—Reptaria.
(Glauconome)—Pinnatopora.
(Ptilionella)—Reptaria.
nodocarinata—Polypora.
nododorsalis—Fenestella.
nodosa—Fenestella.
—Helopora.
—Hemitrypa.
—Monotrypa.
—Orthopora.
—Prasopora.
—Ptilodictya.
—Ptilopora.
—Trematella.

ponderosa—Nicholsonella.
—Ptilodictya.
(Callopora)—Lioclema.
(Fistulipora)—Lioclema.
(Fistuliporina)—Lioclema.
(Trematopora) — Fistulipora maculosa.
ponderosum—Lioclema.
ponderosus—Chætetes.
popeana—Fenestella.
porosa—Polypora.
præcursor—Unitrypa.
prænuntia—Dekayella.
prænuntia-multipora—Dekayella.
prænuntia-nævigera—Dekayella.
prænuntia-simplex—Dekayella.
prima—Rhinopora.
(Hemitrypa)—Unitrypa nervia.
primigenia—Trematopora.
primigenia-ornata—Trematopora.
primigenia-spinosa—Trematopora.
primitiva—Berenicea.
prisca—Reteporina.
—Streblotrypa.
(Cavea)—Streblotrypa.
(Fenestella)—Semicoscinium tenuiceps.
(Retepora)—Reteporina.
proceritas—Fenestella.
projecta—Unitrypa acaulis.
prolifera—Acrogenia.
prolifica—Fistulipora.
(Heterotrypa)—Heterotrypa subramosa-prolifica.
(Monticulipora) — Heterotrypa subramosa-prolifica.
prolixa—Fenestella.
proporoides (Fistulipora) — Pinacotrypa elegans.
propria (Fenestella)—Polypora.
proutana—Fenestella.
—Hemitrypa.
(Stomatopora) — Stomatopora delicatula.
proutana-nodulosa—Hemitrypa.
proutana-vermifera—Hemitrypa.
proutanus—Archimedes.
prouti—Ptilopora.
proxima—Monotrypa.
proximus (Favosites)—Monotrypa.
psyche—Polypora.
pulchella—Callopora.
—Fenestella.
—Polypora.
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pulchella-persimilis—Callopora.
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pulchellus (Chætetes)— Callopora andrewsi.
pulchra—Nicholsonella.
pumila—Pachydictya.
pumila-sublata—Pachydictya.
punctata—Constellaria.
—Phænopora.
—Trematopora.
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punctillatum—Lioclema.
punctipora—Glyptopora.
—Stictotrypa.
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punctostriata—Polypora.
pustulosa—Amplexopora.
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—Fistulipora.
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puteolata—Intrapora.
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—Polypora.
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—Monotrypella.
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—Vinella.
radiata—Ceramopora.
—Evactinopora.
—Lichenalia.
—Paleschara.

radiata—Scenellopora.
radiciformis-conferta—Vinella.
ramosa—Atactoporella.
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—Ceriopora.
—Escharopora.
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—Nematopora.
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—Escharopora.
—Stomatopora.
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(Stictopora)—Cystodictya.
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(Trematopora)—Orthopora.
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(Rhombopora)—Orthopora.
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(Trematopora)—Orthopora.
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(Ptilodictya)—Stictoporina.
retrorsa—Lyropora.
—Nematopora.
—Polypora.
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(Archimedes)—Archimedes wortheni.
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rhombicus—Cœloconus.
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—Reteporina.
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(Cycloporina)—Semicoscinium semirotundum.
(Stictopora)—Tæniodictya.
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rigida—Cystodictya.
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(Stictopora)—Cystodictya.
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—Polypora.
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—Callotrypa.
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  —Trematopora.
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  —Fenestella.
  —Polypora.
  (Atactopora)—Atactoporella.
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tenuimurale—Hemiphragma.
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  —Chætetes.
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LIST OF PAPERS TREATING OF BRYOZOA.

The following list includes all papers which treat exclusively of bryozoa. Works of which the bryozoa form an incidental part have been included when the bryozoa portion was deemed important. Doubtless a considerable number of papers have been overlooked, but it is hoped that the omissions will not prove serious.

For easy reference the authors' names have been arranged alphabetically, and their papers have been listed in chronological order. The dates given may not always be exactly correct, but they are probably seldom far astray. In cases where the actual date of publication is known to be considerably different from the title-page date the former is used. Titles of serials have usually been written in full in this list, but abbreviated in the second list.

In the second list the foregoing papers have been rearranged under several heads, so as to bring together those answering the needs of special workers. It has not been deemed practicable to classify except under large heads. Some errors in classification will no doubt be detected. Occasionally the titles given to their papers by authors are unintentionally misleading. A large number of papers I have been unable to examine, and many references are given on the authority of other writers.

Under the several heads the chronologic order has been adopted, as such an arrangement is very suggestive, both of the progress of knowledge and the point of view of the several authors. Under each year the authors' names are arranged alphabetically. Some works which I have not examined are included under "General;" an examination of these might show however that they would be more appropriately placed under other heads.

It is hoped that the general usefulness of the list will atone for unavoidable shortcomings. The amount of literature devoted to one comparatively small class of the animal kingdom will no doubt be surprising.

For the opportunity of consulting the libraries of Washington, District of Columbia, without which the list could not have been compiled, I have to thank the Hon. Charles D. Walcott, Director of the United States Geological Survey. Some members of the staff of the United States National Museum, and especially Mr. Charles Schuchert, have given valued help.

JOHN M. NICKLES.

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AGASSIZ, ALEXANDER.

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ALDER, JOSHUA.

1857. Descriptions of new British Polyzoa. (Quarterly Journal of Microscopical Science, V, 1857, pp. 24–25, pls. xiii, xiv.)

1857. On a new species of Bugula. (Quarterly Journal of Microscopical Science, V, 1857, pp. 174–175, pl. xvii.)

1857. A catalogue of the Zoophytes of Northumberland and Durham. (Transactions of the Tyneside Naturalists' Field Club, III, 1858 [1857], pp. 93–162, pls. iii–x; Bryozoa on pls. vii, viii, x.)

1863. Supplement to a catalogue of the Zoophytes of Northumberland and Durham. (Transactions of the Tyneside Naturalists' Field Club, V, 1863, pp. 225–247, pls. viii–xi [Hydroids].)

1863. Report of the dredging expedition to the Dogger Bank and the coasts of Northumberland: Zoophytes. (Transactions of the Tyneside Naturalists' Field Club, V, 1863, pp. 288–290.)

1864. Descriptions of new British Polyzoa, with remarks on some imperfectly known species. (Quarterly Journal of Microscopical Science [n. s.], IV, 1864, pp. 95–109, pls. ii–iv.) Abstract. (Report of the Thirty-third Meeting of the British Association for the Advancement of Science [1863] 1864, Transactions of the Sections, pp. 97–98.)

1867. Description of three new or imperfectly known Polyzoa found on the coasts of Northumberland and Durham. (Natural History Transactions of Northumberland and Durham, I, 1867, pp. 60–64, 1 pl.)

ALLEN, H.

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ALLMAN, GEORGE JAMES.

1843. On Plumatella repens. (Report of the Thirteenth Meeting of the British Association for the Advancement of Science, 1843 [London, 1844], part 2, pp. 74–76.) (L'Institut, XI, 1843, p. 454.)

1843. Synopsis of the genera and species of Zoophytes inhabiting the fresh waters of Ireland. (Report of the Thirteenth Meeting of the British Association for the Advancement of Science, 1843 [London, 1844], part 2, p. 77.) (Annals and Magazine of Natural History, XIII, 1844, pp. 328-331.)

1844. On the muscular system of Paludicella and other Ascidian Zoophytes of fresh water. (Proceedings of the Royal Irish Academy, II, 1844, pp. 319-332.)

1844. On Fredericella sultana. (Proceedings of the Royal Irish Academy, II, 1844, pp. 545-546.)

1847. On the locomotive larva of Plumatella fruticosa. (Report of the Sixteenth Meeting of the British Association for the Advancement of Science, 1847 [London, 1848], part 2, p. 74.)

1847. On the larva state of Plumatella. (Proceedings of the Royal Irish Academy, III, 1847, pp. 218-219, 220-222.)

1849. On the natural history of the genus Alcyonella. (Proceedings of the Royal Irish Academy, IV, 1849, pp. 470-478.)

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1849. On Lophopus cristallinus. (Report of the Nineteenth Meeting of the British Association for the Advancement of Science, 1849 [London, 1850], part 2, p. 72.) (L'Institut, XVIII, 1850, p. 16.)

1849. On a new fresh-water Bryozoon. (Report of the Nineteenth Meeting of the British Association for the Advancement of Science, 1849 [London, 1850], part 2, p. 72.)

1850. On the present state of our knowledge of the fresh-water Polyzoa. (Report of the Twentieth Meeting of the British Association for the Advancement of Science, 1850 [London, 1851], pp. 305-337.)

1853. On the reproductive system and development of the gemmæ in Paludicella articulata. (Proceedings of the Royal Irish Academy, V, 1853, pp. 18-22.)

1853. On the structure of the muscular fiber in the Polyzoa. (Proceedings of the Royal Irish Academy, V, 1853, pp. 68-69.)

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1879. On the relations of Rhabdopleura. (Journal of the Linnean Society, Zoology, XIV, 1879, pp. 581–586.)

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THE FOREGOING LIST CLASSIFIED.

HEADS OF CLASSIFICATION.

A. Bibliographic—including annual reviews and lists of papers dealing with Bryozoa.
B. General—including works which treat of the Bryozoa as a whole or are too general in scope to come under more particular heads.
C. Biological—including papers concerned mainly with anatomy, morphology, embryology, development, etc.
D. Fresh-water—including papers which treat of fresh-water Bryozoa biologically and systematically.
E. Marine—including papers which treat of living marine Bryozoa mainly from a systematic standpoint.
F. Tertiary and Quaternary.
G. Mesozoic.
H. Paleozoic.

A. BIBLIOGRAPHIC.

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This is the "card system" applied to a current record of publications relating to zoology and several kindred branches. The titles are classified and numbered according to the Dewey decimal classification. Recent Bryozoa are 594.7; fossil Bryozoa 564.7.

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10. Irrigation in Mesilla Valley, New Mexico, by F. C. Barker. 1898. 8°. 51 pp. 11 pl.
11. River Heights for 1896, by Arthur P. Davis. 1897. 8°. 100 pp.
12. Underground Waters of Southeastern Nebraska, by N. H. Darton. 1898. 8°. 56 pp. 21 pl.
13. Irrigation Systems in Texas, by William Ferguson Hutson. 1898. 8°. 67 pp. 10 pl.
14. New Tests of Pumps and Water-Lifts used in Irrigation, by O. P. Hood. 1898. 8°. 91 pp. 1 pl.
15. Operations at River Stations, 1897, Part I. 1898. 8°. 100 pp.
16. Operations at River Stations, 1897, Part II. 1898. 8°. 101-200 pp.
7. Irrigation near Bakersfield, California, by C. E. Grunsky. 1898. 8°. 96 pp. 16 pl.

No.	Name of sheet.	State.	Limiting meridians.	Limiting parallels.	Area, in square miles.	Price, in cents.
54	Tacoma	Washington.	122°-122° 30′	47°-47° 30′	812	25
55	Fort Benton	Montana	110°-111°	47°-48°	3, 273	25
56	Little Belt Mts	Montana	110°-111°	46°-47°	3, 295	25
57	Telluride	Colorado	107° 45′-108°	37° 45′-38°	236	25
58	Elmoro	Colorado	104°-104° 30′	37°-37° 30′	950	25
59	Bristol	Virginia Tennessee	82°-82° 30′	36° 30′-37°	957	25
62	Menominee Special	Michigan	87° 44′-88° 09′	45° 44′-45° 55′	254	25

STATISTICAL PAPERS.

Mineral Resources of the United States, 1882, by Albert Williams, jr. 1883. 8°. xvii, 813 pp. Price 50 cents.

Mineral Resources of the United States, 1883 and 1884, by Albert Williams, jr. 1885. 8°. xiv, 1016 pp. Price 60 cents.

Mineral Resources of the United States, 1885. Division of Mining Statistics and Technology. 1886. 8°. vii, 576 pp. Price 40 cents.

Mineral Resources of the United States, 1886, by David T. Day. 1887. 8°. viii, 813 pp. Price 50 cents.

Mineral Resources of the United States, 1887, by David T. Day. 1888. 8°. vii, 832 pp. Price 50 cents.

Mineral Resources of the United States, 1888, by David T. Day. 1890. 8°. vii, 652 pp. Price 50 cents.

Mineral Resources of the United States. 1889 and 1890, by David T. Day. 1892. 8°. viii, 671 pp. Price 50 cents.

Mineral Resources of the United States, 1891, by David T. Day. 1893. 8°. vii, 630 pp. Price 50 cents.

Mineral Resources of the United States, 1892, by David T. Day. 1893. 8°. vii, 850 pp. Price 50 cents.

Mineral Resources of the United States, 1893, by David T. Day. 1894. 8°. viii, 810 pp. Price 50 cents.

On March 2, 1895, the following provision was included in an act of Congress:

"*Provided*, That hereafter the report of the mineral resources of the United States shall be issued as a part of the report of the Director of the Geological Survey."

In compliance with this legislation the following reports have been published:

Mineral Resources of the United States, 1894, David T. Day, Chief of Division. 1895. 8°. xv, 646 pp., 23 pl.; xix, 735 pp., 6 pl. Being Parts III and IV of the Sixteenth Annual Report.

Mineral Resources of the United States, 1895, David T. Day, Chief of Division. 1896. 8°. xxiii, 542 pp., 8 pl. and maps; iii, 543-1058 pp., 9-13 pl. Being Part III (in 2 vols.) of the Seventeenth Annual Report.

Mineral Resources of the United States, 1896, David T. Day, Chief of Division. 1897. 8°. xii, 642 pp., 1 pl.; 643-1400 pp. Being Part V (in 2 vols.) of the Eighteenth Annual Report.

Mineral Resources of the United States, 1897, David T. Day, Chief of Division. 1898. 8°. viii, 651 pp., 11 pl.; viii, 706 pp. Being Part VI (in 2 vols.) of the Nineteenth Annual Report.

Mineral Resources of the United States, 1898, David T. Day, Chief of Division. 1899. 8°. viii, 616 pp.; ix, 804 pp., 1 pl. Being Part VI (in 2 vols.) of the Twentieth Annual Report.

The money received from the sale of the Survey publications is deposited in the Treasury, and the Secretary of the Treasury declines to receive bank checks, drafts, or postage stamps; all remittances, therefore, must be by MONEY ORDER, made payable to the Director of the United States Geological Survey, or in CURRENCY—the exact amount. Correspondence relating to the publications of the Survey should be addressed to—

THE DIRECTOR,
UNITED STATES GEOLOGICAL SURVEY,
WASHINGTON, D. C.

WASHINGTON, D. C., *August, 1900.*

No.	Name of sheet.	State.	Limiting meridians.	Limiting parallels.	Area, in square miles.	Price, in cents.
1	Livingston	Montana	110°-111°	45°-46°	3,354	25
2	Ringgold	Georgia Tennessee	85°-85° 30′	34° 30′-35°	980	25
3	Placerville	California	120° 30′-121°	38° 30′-39°	932	25
4	Kingston *a*	Tennessee	84° 30′-85°	35° 30′-36°	969	25
5	Sacramento	California	121°-121° 30′	38° 30′-39°	932	25
6	Chattanooga	Tennessee	85°-85° 30′	35°-35° 30′	975	25
7	Pikes Peak *a*	Colorado	105°-105° 30′	38° 30′-39°	932	25
8	Sewanee	Tennessee	85° 30′-86°	35°-35° 30′	975	25
9	Anthracite-Crested Butte.	Colorado	106° 45′-107° 15′	38° 45′-39°	465	50
10	Harpers Ferry	Virginia West Va Maryland	77° 30′-78°	39°-39° 30′	925	25
11	Jackson	California	120° 30′-121°	38°-38° 30′	938	25
12	Estillville	Virginia Kentucky Tennessee	82° 30′-83°	36° 30′-37°	957	25
13	Fredericksburg	Maryland Virginia	77°-77° 30′	38°-38° 30′	938	25
14	Staunton	Virginia West Va	79°-79° 30′	38°-38° 30′	938	25
15	Lassen Peak	California	121°-122°	40°-41°	3,634	25
16	Knoxville	Tennessee N.Carolina	83° 30′-84°	35° 30′-36°	925	25
17	Marysville	California	121° 30′-122°	39°-39° 30′	925	25
18	Smartsville	California	121°-121° 30′	39°-39° 30′	925	25
19	Stevenson	Alabama Georgia Tennessee	85° 30′-86°	34° 30′-35°	980	25
20	Cleveland	Tennessee	84° 30′-85°	35°-35° 30′	975	25
21	Pikeville	Tennessee	85°-85° 30′	35° 30′-36°	969	25
22	McMinnville	Tennessee	85° 30′-86°	35° 30′-36°	969	25
23	Nomini	Maryland Virginia	76° 30′-77°	38°-38° 30′	938	25
24	Three Forks	Montana	111°-112°	45°-46°	3,354	50
25	Loudon	Tennessee	84°-84° 30′	35° 30′-36°	969	25
26	Pocahontas	Virginia West Va	81°-81° 30′	37°-37° 30′	951	25
27	Morristown	Tennessee	83°-83° 30′		963	25
28	Piedmont	Maryland West Va	79°-79° 30′	39°-39° 30′	925	25
29	Nevada City:					
	Nevada City	California	121° 00′ 25″-121° 03′ 45″	39° 13′ 50″-39° 17′ 16″	11.65	50
	Grass Valley		121° 01′ 35″-121° 05′ 04″	39° 10′ 22″-39° 13′ 50″	12.09	
	Banner Hill		120° 57′ 05″-121° 00′ 25″	39° 13′ 50″-39° 17′ 16″	11.65	
30	Yellowstone National Park: Gallatin Canyon Shoshone Lake	Wyoming	110°-111°	44°-45°	3,412	75
31	Pyramid Peak	California	120°-120° 30′	38° 30′-39°	932	25
32	Franklin	Virginia West Va	79°-79° 30′	38° 30′-39°	932	25
33	Briceville	Tennessee	84°-84° 30′	36°-36° 30′	963	25
34	Buckhannon	West Va	80°-80° 30′	38° 30′-39°	932	25
35	Gadsden	Alabama	86°-86° 30′	34°-34° 30′	986	25
36	Pueblo	Colorado	104° 30′-105°	38°-38° 30′	938	50
37	Downieville	California	120° 30′-121°	39° 30′-40°	919	25
38	Butte Special	Montana	112° 29′ 30″-112° 36′ 42″	45° 59′ 28″-46° 02′ 54″	22.80	50
39	Truckee	California	120°-120° 30′	39°-39° 30′	925	25
40	Wartburg	Tennessee	84° 30′-85°	36°-36° 30′	963	25
41	Sonora	California	120°-120° 30′	37° 30′-38°	944	25
42	Nueces	Texas	100°-100° 30′	29° 30′-30°	1,035	25
43	Bidwell Bar	California	121°-121° 30′	39° 30′-40°	918	25
44	Tazewell	Virginia West Va	81° 30′-82°	37°-37° 30′	950	25
45	Boise	Idaho	116°-116° 30′	43° 30′-44°	864	25
46	Richmond	Kentucky	84°-84° 30′	37° 30′-38°	944	25
47	London	Kentucky	84°-84° 30′	37°-37° 30′	950	25
48	Tenmile District Special.	Colorado	106° 8′-106° 16′	39° 22′ 30″-39° 30′ 30″	55	25
49	Roseburg	Oregon	123°-123° 30′	43°-43° 30′	871	25
50	Holyoke	Mass Conn	72° 30′-73°	42°-42° 30′	885	50
51	Big Trees	California	120°-120° 30′	38°-38° 30′	938	25
52	Absaroka: Crandall Ishawooa	Wyoming	109° 30′-110°	44°-44° 30′	1,706	25
53	Standingstone	Tennessee	85°-85° 30′	36°-36° 30′	963	25

a Out of stock.

LIBRARY CATALOGUE SLIPS.

[Take this leaf out and paste the separated titles upon three of your catalogue cards. The first and second titles need no addition; over the third write that subject under which you would place the book in your library.]

Series.

United States. *Department of the interior.* (*U. S. geological survey.*)
Department of the interior | — | Bulletin | of the | United States | geological survey | no. 173 | [Seal of the department] |
Washington | government printing office | 1900
Second title: United States geological survey | Charles D. Walcott, director | — | A synopsis | of | American fossil bryozoa | including | bibliography and synonymy | by | John M. Nickles and Ray S. Bassler | [Vignette] |
Washington | government printing office | 1900
8°. 663 pp.

Author.

Nickles (John M.) and **Bassler** (Ray S.).
United States geological survey | Charles D. Walcott, director | — | A synopsis | of | American fossil bryozoa | including | bibliography and synonymy | by | John M. Nickles and Ray S. Bassler | [Vignette] |
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CHARLES D. WALCOTT, DIRECTOR

SURVEY

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NORTHWESTERN BOUNDARY OF THE UNITED STATES

1857-1861

BY

MARCUS BAKER

WASHINGTON
GOVERNMENT PRINTING OFFICE
1900

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LETTER OF TRANSMITTAL.

DEPARTMENT OF THE INTERIOR,
UNITED STATES GEOLOGICAL SURVEY,
Washington, D. C., June 9, 1900.

SIR: I have the honor to transmit herewith, for publication as a bulletin, an account of the establishment of and survey of the boundary line between the United States and Canada, along the forty-ninth parallel, from the summit of the Rocky Mountains to the Pacific.

Very respectfully,

MARCUS BAKER, *Cartographer.*

Hon. CHARLES D. WALCOTT,
Director United States Geological Survey.

SURVEY OF THE NORTHWESTERN BOUNDARY OF THE UNITED STATES, 1857-1861.

By MARCUS BAKER.

INTRODUCTION.

By the Northwestern Boundary, as here used, is meant that part of the boundary line between the United States and Canada which extends from the summit of the Rocky Mountains westward along the forty-ninth parallel to the seacoast at Point Roberts and thence through the waters of Georgia, Haro, and Juan de Fuca straits to the Pacific. This line naturally divides itself into two parts, the land boundary and the water boundary. This paper treats only of the land boundary. As to the water boundary, the joint commission charged with the survey disagreed, and its location was finally determined by arbitration in 1871, the arbiter, Emperor William I, of Germany, deciding in favor of the American claim. The prominence given this part of the line, growing out of the arbitration, has made its history well known. In regard to it there is an abundance of printed material. The history of the land boundary, however, is very imperfectly known. Little has been published respecting it, and its story is to be gathered largely from manuscript memoranda, notes, sketches, pictures, correspondence, and the memories of men still living.

From time to time information respecting this line is needed by the Executive Departments. In 1897 the Geological Survey was directed by Congress to survey and mark the boundary between Montana and Idaho. In performing this duty it became necessary to connect with the survey of the forty-ninth parallel. The search then made of the records in the State Department showed the desirability of preparing a concise history of the northwestern boundary, its establishment, survey, and marking, with a summary of results. To exhibit such a history and summary is the object of this bulletin.

SOURCES OF INFORMATION.

The sources of information from which this account is prepared are three, viz:

(a) Government publications, consisting of the Statutes at Large, executive documents, official reports, etc.

(b) Manuscript records in the State Department, consisting of the original notebooks, observations, computations, plattings, sketches, maps, correspondence, etc.

(c) The memories of some of the surviving participants in the survey. These will be discussed in the order indicated above.

(a) In the Statutes at Large are contained all laws enacted by Congress touching the boundary, including also all the treaties. For the original treaty of June 15, 1846, see vol. 9, pages 869–870; for the act creating the commission to survey and mark the boundary, vol. 11, page, 42; for various appropriation acts, vol. 11, pages 42, 159, 312, 403, and vol. 12, page 20.

On November 12, 1859, Lieut. (now Gen.) John G. Parke, chief astronomer and surveyor, made a short report of progress. This is a document of 7 pages and is printed as Senate Ex. Doc. No. 16, Thirty-sixth Congress, first session. It is here reprinted as Appendix B.

Nothing further, in official documents, appears for nine years. The civil war turned attention to more urgent matters and this subject was dropped. In February, 1868, however, President Johnson sent to the Senate a long communication on the San Juan boundary question. This document (Senate Ex. Doc. No. 29, Fortieth Congress, second session) of 280 pages, though dealing chiefly with the water boundary, nevertheless throws considerable light on the history of the land boundary.

On January 13, 1869, the House of Representatives, by a resolution, requested information as to expenditures by the Northwestern Boundary Commission. In response, a message from President Johnson was laid before the House of Representatives on February 13, 1869. (House Ex. Doc. No. 86, Fortieth Congress, third session.) This document of 102 pages is almost wholly given to a detailed tabular exhibit of expenditures. There is, however, a letter of 4 pages from the commissioner, Hon. Archibald Campbell, summarizing the entire history of the survey. This is apparently the nearest approach to a report on this subject that has ever appeared in print.

Finally, in 1889, Capt. George M. Wheeler, U. S. A., published in his report upon geographical surveys west of the one hundredth meridian (vol. 1, pp. 614–619) a short account of the Survey of the Northwestern Boundary of the United States 1857–1861.

(b) The manuscript records of the survey are nearly all contained in two blue chests stored in the division of manuscripts in the library of the State Department. Some of the maps being too large to go into these chests are kept elsewhere in the library. The memoranda, notes, correspondence, maps, etc., in this collection are the chief source of information from which this account has been prepared. But unfortunately the most important document of all was not found there, and a diligent search has failed to bring it to light. This paper is the final report, written on foolscap paper and consisting of four parts, one by

Archibald Campbell, the commissioner; one by Gen. J. G. Parke, chief astronomer and surveyor; one by G. Clinton Gardner, assistant astronomer and surveyor, and one by J. S. Harris, general assistant. For this description of the missing manuscript I am indebted to Mr. William J. Warren, Bureau of Engineers, War Department. When Captain Wheeler was preparing his account of this survey he made an unsuccessful search for this missing report. He says:[1]

> I have been unable to trace the manuscript of the final report, including that of the chief astronomer and the specialists, which it is believed was made. According to the Journal of the Senate of February 9, 1871, this report was called for by the Senate, but a search of the Senate records and also those of the State Department, made at my request by Mr. Dwight, librarian of the State Department, remained unavailing on June 15, 1887. Mr. William J. Warren, secretary of the commissioner [and] now chief clerk [in the office] of the [Chief of] Engineer[s] [War] Department, recollects to have seen the manuscript of this report at the office of the Northern Boundary [Survey], established in 1873, as does also Maj. J. F. Gregory, Corps of Engineers, a member of that commission, but it could not be found by Mr. Dwight in the records transmitted at the close of the latter survey to the State Department.

The search above mentioned I have now repeated and with like result. The manuscript has not been found.

The existence of the manuscript is attested by Mr. Warren, who gave me the description above written. The call for it made by the Senate in 1871 is set forth in the following extract from the Senate Journal of February 9, 1871, page 254:

> Mr. Howard [Jacob M., of Michigan] submitted the following resolution, which was considered by unanimous consent, and agreed to:
>
> "*Resolved*, That the President be respectfully requested, if not incompatible with the public interests, to transmit to the Senate copies of the final report, and the accompanying documents, of the commissioner on the part of the United States to carry into effect the first article of the treaty with Great Britain of June 15, 1846."

An examination of the records in the office of the Secretary of the Senate reveals no other entry concerning it, from which it is concluded that it was never sent. Similarly an examination of the records in the Index Bureau of the State Department shows the call, but no action is indorsed thereon, thus corroborating the belief that it was not sent.

When the *Northern* Boundary Commission was created, in 1872, Mr. Archibald Campbell was appointed United States commissioner of *that* survey also. He found at the outset that it was desirable to have for reference the records of the *Northwestern* Boundary Survey, and accordingly wrote to the State Department asking permission to withdraw those records for temporary use.

The following is a copy of his letter, which is now on file in the Index Bureau of the State Department:

> U. S. NORTHERN BOUNDARY COMMISSION,
> *Washington, D. C., June 27, 1872.*
>
> SIR: In preparing for the duties of the boundary commission it would be of the greatest assistance to have the use of the records, notebooks, and other papers of

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[1] G. M. Wheeler, U. S. Geog. Surv. W. One Hundredth Mer. 4°. Washington, 1889, vol. 1, p. 617.

the Northwest Boundary Commission, deposited by me in the Department at the close of the work in October, 1869.

I have therefore the honor to request that you allow me to withdraw these records and papers temporarily. Before leaving for the field they will be returned to the Department.

I have the honor to be, very respectfully, your obedient servant,

ARCHIBALD CAMPBELL,
Commissioner, Northern Boundary Survey.

Hon. CHAS. HALE,
Acting Secretary of State.

Upon that letter is indorsed: "Papers, etc., herein referred to sent to Mr. Campbell 27th June."

A search of the records of the Index Bureau of the State Department fails to reveal any other entry touching these papers. If they were returned no record was made of such return. It is certain that these papers were in the possession of the Northern Boundary Commission in 1872. Beyond that there is no trace. It would therefore be natural to look for them among the papers of the Northern Boundary Commission, which were sent to the State Department on June 30, 1876. But a search among these papers made by me in March, 1900, was unsuccessful. The missing manuscript was not found.

Prof. C. L. Doolittle, now at the Flower Observatory at Upper Darby, Pennsylvania, was connected with the Northern Boundary Survey. In response to an inquiry as to whether he had any information touching the report desired, he writes, among other things, under date of March 12, 1900:

> My connection with the northern boundary began after active operations had been going on for a year. We then had our office at Detroit. After field operations were completed we removed to Washington. It is not a great exaggeration to say that I saw every scrap of paper to be found in the Detroit office. At all events, this report was not to be found there. I remember hearing such a report spoken of, but it was then said to be stored away with other Government archives at Washington.

(c) Archibald Campbell, the commissioner, died in the city of Washington July 27, 1887. To his son, Charles Campbell, now an employee in the Department of State, I am indebted for information as to the survey. I have also conferred with Gen. J. G. Parke, Corps of Engineers, U. S. A. (retired), who was chief astronomer and surveyor of the Northwestern Boundary Survey Commission, and with Mr. William J. Warren, chief clerk in the office of the Chief of Engineers, U. S. A., who was secretary of the commission. To both of these gentlemen, and especially to the latter, I am indebted for information used in preparing this account. Mr. G. Clinton Gardner, the assistant astronomer and surveyor from 1857 to 1868, is now a civil engineer in Peru, South America, while Mr. Joseph S. Harris, general assistant Northwest Boundary Survey from 1857 to 1864, is now president of the Philadelphia and Reading Railroad. To both of these gentlemen I am indebted for letters relating to the boundary and its survey. I have also talked on this subject with Mr. J. V. Wurdemann, now employed in the Library of Congress, who participated in the survey and with Dr. Theodore Gill, who prepared a report on the fishes collected by the survey. To the courtesy of these gentlemen as also to that of Prof. C. L. Doolittle, to the Smithsonian Institution, to the Coast Survey, and to the General Land Office I am indebted for bits of information used in preparing this report.

ESTABLISHMENT OF THE LINE.

The present boundary line between British Columbia on the north and Washington, Idaho, and Montana on the south was established in 1846. Prior to that date the boundary was in dispute between the United States and Great Britain and the Oregon question was a burning one. Great Britain claimed as far south as forty-two degrees north latitude, the northern limit of California to-day. The United States claimed as far north as 54° 40′, the present southern boundary of Alaska. The slogan of the day was "Fifty-four forty or fight." But there was no fight and no fifty-four forty. A treaty was arranged by which the disputed tract was divided between the claimants. The boundary line adopted was the present line along the forty-ninth parallel from the summit of the Rocky Mountains to the middle of the channel between Vancouver Island and the continent and thence southward along the main channel and Juan de Fuca Strait to the Pacific.

The diplomatic agents who drew this treaty were, on the part of the United States, James Buchanan, then Secretary of State, and on the part of Great Britain, the then British minister, Richard Pakenham. The treaty was signed at Washington June 15, 1846, ratifications exchanged at London July 17, and proclaimed August 5, 1846.[1]

The first article of the treaty describes the boundary in the following words:

> From the point on the 49th parallel of north latitude, where the boundary laid down in existing treaties and conventions between the United States and Great Britain terminates, the line of boundary between the Territories of the United States and those of Her Britannic Majesty shall be continued westward along the said 49th parallel of north latitude, to the middle of the channel which separates the continent from Vancouver's Island and thence southerly through the middle of the said channel, and of Fuca's [Juan de Fuca] Straits, to the Pacific Ocean.

HISTORY OF THE SURVEY.

On August 11, 1856, almost exactly ten years after the proclaiming of the treaty of limits, which for brevity may be called the Buchanan-Pakenham treaty, Congress passed an act to carry its first article into effect. This act provided for the appointment of a commissioner and a chief astronomer and surveyor on the part of the United States to unite with similar officers to be appointed by Great Britain to survey the boundary and mark it with monuments. It also provided for the appointment of an assistant astronomer and surveyor, a secretary, and a clerk; it appropriated $11,000 for the annual salary of these five officers, and $60,000 for provisions, transportation, and contingencies; it restricted the work to the northern boundary of Washington, which then extended from the Rocky Mountains to the Pacific; and finally it authorized the President to direct the employment of such officers, assistants, and vessels of the Coast Survey as he might deem necessary or useful.

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[1] Stat. L., vol. 9, pp. 869-870; vol. 11, p. 42.

Under this law Mr. Archibald Campbell was appointed commissioner on February 14, 1857, and on the same day Lieut. (now Gen.) John G. Parke, Corps of Engineers, U. S. A., was appointed chief astronomer and surveyor,[1] each at a salary of $3,000 per annum. Two weeks later, viz, February 28, 1857, Mr. G. Clinton Gardner was appointed assistant astronomer and surveyor, and on April 5 entered upon his duties. On April 9 Mr. William J. Warren (now chief clerk Office of Chief of Engineers, U. S. A.) was appointed secretary, and on March 6 Mr. John J. Major was appointed clerk to the commissioner. Mr. Campbell remained commissioner to the end in 1869. On the outbreak of the civil war, in the spring of 1861, General Parke left the work and never returned to it. Messrs. Gardner and Warren served with the commission until December 31, 1868, and perhaps a little later.[2] Mr. Major resigned December 9, 1864.

Of the other principal employees, Mr. Joseph S. Harris, now president of the Philadelphia and Reading Railroad, is recorded as assistant surgeon and naturalist March 27, 1857, to March 31, 1864, when he left the survey to engage in private business. Francis Herbst and Henry Custer served as topographers, the former about two years from April 16, 1857, till March 31, 1859, the latter about seven years from April 16, 1857, till June 30, 1864. Mr. J. Nevine King served as quartermaster and commissary from May 21, 1857, to January 15, 1861; Mr. George Gibbs as geologist and interpreter from June 22, 1857, till May 31, 1862, and Mr. R. V. Peabody as guide from August 1, 1857, to January 15, 1861. Dr. C. B. R. Kennerly served as surgeon and naturalist from March 22, 1857, till his death in 1861.

On February 28, 1857, Mr. Campbell received his instructions from the Secretary of State, dated February 25, whereupon, he says, "I proceeded at once to collect all such information within my reach which might contribute to a proper understanding of the meaning of the language of the treaty, and in the execution of the work intrusted to me.[3] Having arranged with Professor Bache, Superintendent of the Coast Survey, for the use of the surveying steamer *Active* and the brig

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[1] House Ex. Doc. No. 86, Fortieth Congress, Third session, p. 100.
[2] House Ex. Doc. No. 86, Fortieth Congress, Third session, p. 23.
[3] Senate Ex. Doc., No. 29, Fortieth Congress, second session, p. 8.

Fauntleroy, with the officers and assistants attached,[1] Mr. Campbell sailed from New York April 20 and reached San Francisco via the Isthmus of Panama on May 15. On June 17 the party sailed on the *Active* for Victoria, where they arrived five days later and learned that the first British commissioner, Capt. James Charles Prevost, R. N., commanding H. B. M. S. *Satellite*, had arrived at Esquimalt ten days before. The second British commissioner was Capt. George Henry Richards, R. N., whose ordinary duties were those of chief astronomer and surveyor, he being empowered to act as commissioner only in the event of the death of Captain Prevost. Captain Richards, commanding the British steamer *Plumper*, left England at the close of March, 1857, for Victoria. By an accident to the *Plumper's* machinery he was delayed at Rio de Janeiro for some time and did not reach Victoria till November, 1857. The powers of these first and second British commissioners did not extend to the whole line, but only to the water boundary. "So much of the boundary between her Majesty's possessions in North America and the territories of the United States as is comprised between the continent of America and Vancouver's Island." Such is the language of the instructions to Captain Prevost.

The British and American commissioners held their first meeting on Saturday, June 27, 1857, on board the *Satellite* in Esquimalt harbor. The respective commissions of themselves and assistants were exhibited, read, and found in due form. A second meeting was held three weeks later in Nanaimo harbor on board the *Satellite*. Captain Richards not yet having arrived, it was decided that nothing further could be done with the water-boundary question.

Accordingly the American party proceeded to the vicinity of the forty-ninth parallel at Point Roberts on the mainland and began operations on the land boundary. It was not till the summer of the next year, 1858, that the British commissioner for surveying the land boundary, Col. J. S. Hawkins, Royal Engineers, arrived from England. The American parties worked, therefore, alone during the fall and winter of 1857 and spring of 1858. "Before the spring [of 1858] four astronomical points on the 49th parallel were determined, and the country thoroughly reconnoitered in the vicinity of the parallel, for a considerable distance eastward."[2]

After the arrival of Colonel Hawkins a joint meeting of the commission was held to arrange a plan of field operations for surveying and marking the line. The outcome of that meeting is set forth in the following agreement:[2]

> After discussing plans for determining and marking the line as far eastward as the Cascade Mountains, it was concluded to be inexpedient at the present time, in con-

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[1] From Coast Survey Report for 1857, p. 116, we learn that, "At request of State Department," steamer *Active* and party, in charge of Lieut. Commander Richard M. Cuyler, U. S. N., were placed at disposal of Archibald Campbell, esq., commissioner of the Northwestern Boundary Survey.

[2] House Ex. Doc. No. 86, Fortieth Congress, Third session, p. 95.

> sequence of the great expense, consumption of time, and the impracticable nature of the country, to mark the whole boundary by cutting a track through the dense forest.
>
> It was therefore agreed to ascertain points on the line by the determination of astronomical points at convenient intervals on or near the boundary, and to mark such astronomical stations or points fixed on the parallel forming the boundary by cutting a track of not less than 20 feet in width on each side for the distance of half a mile or more, according to circumstances. Further, that the boundary be determined and similarly marked where it crosses streams of any size, permanent trails, or any striking natural feature of the country.
>
> In the vicinity of settlements on or near the line it is deemed advisable to cut the track for a greater distance and to mark it in a manner to be determined hereafter.

This arrangement for the part west of the Cascades appears to have been subsequently applied to the whole line; and thus it resulted that of the entire boundary, 409.5 miles long, from the boundary station on the crest of the Rocky Mountains westward to the obelisk on the western side of Point Roberts, 190 miles were cleared and marked and 220 miles were not traced out, cleared, surveyed, or marked. These figures are obtained by scaling off from the final maps.

At the end of the season of 1858 the line had been reconnoitered eastward as far as the valley of the Skagit, near the one hundred and twenty-first meridian, a distance of about 90 miles, and the astronomical observations necessary for determining three points on the parallel in the valley of the Chiloweyuck completed.

In the season of 1859 the work of surveying and marking the boundary was carried eastward from the valley of the Skagit to the Columbia River, a distance of about 150 miles. General Parke, writing November 12, 1859, thus summarizes the work done during the season:

> A completion of the determination and marking of the parallel from three points astronomically fixed at the close of the last season.
>
> A complete set of observations for latitude at four stations, from which the parallel has been determined and marked at the crossings of the following streams: The Skagit, Pasayten, Similkameen, Okinakane (Lake Osoyoos), and Nehoialpitkwu; and before the astronomical parties leave the field the necessary observations will be completed for determining two other points of the parallel, the third crossing of the Nehoialpitkwu and the Columbia River.
>
> A chronometer trip for difference of longitude between Camp Simiahmoo and Chiloweyuck depot.
>
> Observations of the transit of the moon and moon-culminating stars at two of the latitude stations for absolute longitude.
>
> A triangulation covering an area of about 50 square miles.
>
> A survey of the nearest practical lines to the parallel, connecting the astronomical stations, making a total distance chained of about 370 miles.
>
> Reconnoissances for developing the topography along and adjacent to the boundary line, and for locating routes of communication. These reconnoissances have extended over an area of about 6,000 square miles.
>
> A full set of magnetic observations were made at one station, and throughout the [illegible]rk all the necessary observations for time, azimuth, micrometer value, and [illegible]umental corrections were carefully made.

In the season of 1860 the surveying and marking of the entire land boundary was nearly or quite completed. I have not found any statement as to just when the field work ended. The Auditor's accounts indicate that a considerable number of laborers, axmen, packers, etc., were employed during 1861, of whom 22 were discharged on March 31 and 14 on June 30. Others received their final pay at various dates in 1861, the latest being in September. General Parke, who came out with the last party, tells me that on reaching the Columbia Plains he heard of the first battle of Bull Run. It seems to me likely, therefore, that the field work closed late in 1860 or early in 1861. During this season, then, the surveying and marking of the line was carried on over a distance of 170 miles—between the summit of the Rocky Mountains and the Columbia River.

As to the disbanding of the field parties and their return to Washington we gather some facts from the Auditor's accounts, so often cited here. It appears that all returned via the Isthmus of Panama, the fare being $258 from San Francisco to New York and $7.50 from New York to Washington. Commissioner Campbell, Secretary Warren, Geologist Gibbs, and Artist Alden left the field November 25, 1860, and reached Washington January 10, 1861, the journey taking forty-six days. Henry Custer, Charles T. Gardner, T. Hudson, and James Nooney left the field April 30, 1861, and G. Clinton Gardner on May 10, 1861. All these came direct to Washington. Finally, in the last quarter of 1861 (exact date not given), General Parke, J. S. Harris, J. V. Wurdemann, and John J. Major returned to Washington. With these returning parties came instruments, records, collections, baggage, etc. There is a charge for freight on "41 packages instruments and baggage" and "24 boxes natural-history specimens."

Arrived in Washington, the commission rented rooms and established an office over a store at the SE. corner of Pennsylvania avenue and Twentieth street NW., and there proceeded with the plattings, computations, drawing of maps, and preparation of the final report. The scientific reports appear to have been completed in 1862 and the drawing of the final maps, at least of the land boundary, late in 1865 or early in 1866. The work upon the report, however, continued, and there began to be some good-natured raillery as to when it would be completed. Finally, on January 13, 1869, the House of Representatives, by a resolution, requested information as to expenditures on account of the Northwestern Boundary Survey. The reply to that request has furnished the chief source of information for this history.[1] In October, 1869, the work was brought to a close and the results deposited in the State Department. But the report, unfortunately, was not published, and the manuscript has for many years been lost to view. Its whereabouts are still unknown. The reason it was not published, I am informed, is that Mr. Fish, Secretary of State at that time, deemed its publication too expensive. The war had brought a mountain of debt, and under these conditions he refused to sanction so costly a publication.

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[1] House Ex. Doc. No. 86, Fortieth Congress, third session.

COST.

The total cost of surveying and marking the line, including all expenses, was about $600,000, or $1,463 per mile. The first appropriation for the work, made August 11, 1856, was $71,000. This and the subsequent appropriations are as follows:

Appropriations for surveying and marking the boundary along the forty-ninth parallel, between the United States and the British Possessions, from the Rocky Mountains to the Pacific Ocean.

Date.	Fixed salaries.	Other expenses.	Total.	Authority.
August 11, 1856	$11,000	$60,000	$71,000	Stat. L., vol. 11, p. 42.
February 7, 1857	11,000	60,000	71,000	Stat. L., vol. 11, pp. 159-160.
June 5, 1858	11,000	60,000	71,000	Stat. L., vol. 11, p. 312.
March 3, 1859	11,000	139,000	150,000	Stat. L., vol. 11, pp. 403-404.
May 26, 1860	11,000	139,000	150,000	Stat. L., vol. 12, pp. 20-21.
Total	55,000	458,000	513,000	

The amount actually expended somewhat exceeded this sum, aggregating nearly $600,000.

In response to the House resolution of January 13, 1869, above referred to, Mr. Seward, then Secretary of State, transmitted, on February 9, 1869, a detailed reply, consisting, in the main, of a statement by Mr. C. M. Walker, then Fifth Auditor of the Treasury Department, of "disbursements on account of Northwest Boundary Survey from February 14, 1857, to December 31, 1868."[1] The total expenditures in that period were for—

Salaries	$385,508.78
Contingent expenses	209,724.25
Total	595,233.03

Most of these were made in the five years 1857 to 1861, inclusive. After the latter year a small office was maintained in Washington at an annual rental of $250, which, with various minor items, entailed an annual expense of from $1,200 to $1,400. The work was finally closed up and the records deposited in the State Department in October, 1869.[2]

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[1] House Ex. Doc. No. 86, Fortieth Congress, third session, 102 pp.

[2] Letter from Archibald Campbell to Acting Secretary of State, June 27, 1872.

For the preparation of scientific reports on magnetics, mammals, birds, fishes, plants, insects, fossils, etc., including the making of drawings, there was expended about $3,500[1] and for the drawing of the final maps about $9,400.

For building the initial monument at Point Roberts was paid $7,590.38, one-half of which was paid by the United States and one-half by Great Britain.[2]

The cost to the British Government of running and marking the boundary line I have not found. A single item bearing on the matter is contained in Parliamentary Papers, 1863, volume 37, page 287 (55–v), where there is "An estimate of the sum required to be voted in the year ending March 31, 1864, to complete the expenses of surveying the line of boundary between the British and United States territory in the western part of North America, 4,300 pounds."

While the boundary survey was going forward there was another independent exploration by the British in progress in the region, under the direction of Capt. John Palliser. Early in 1857 the president of the Royal Geographical Society recommended to the British foreign office that a grant of £5,000 be voted to cover the expense of two years' exploration along the forty-ninth and fifty-third parallels and between the one hundredth and one hundred and fifteenth meridians.[3] This sum was voted and later on £1,500 additional, to continue the work one year more, making three years in all. Among the estimates for the year ending March 31, 1861, is an item of £6,300 for completing Palliser's explorations. The results of Palliser's work, his route of travel, etc., are set forth in the Journal of the Royal Geographical Society of London, 1859, volume 29, pages xcvii–c; and 1860, volume 30, pages 267–314.

MAPS.

ORIGINAL MANUSCRIPT MAPS.

Two large blue chests in the manuscript room at the State Department contain the original observations, computations, sketches, notes, etc., relating to the Northwestern Boundary Survey. They do not contain the final maps, these being kept among the treaty maps. They do, however, contain the following manuscript map material, which may be classified as preliminary and final:

Preliminary.—First. Several rolls of rough sketches of reconnoissances, triangulation, trails, office plattings, field sketches, etc., on rough paper, drawing paper, tracing linen, and tracing paper. Some of this is original field material identified by title, date, and signature. Much of it, however, is of the nature of office studies, plattings, etc., which served a temporary purpose and is no longer of value.

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[1] House Ex. Doc. No. 86, Fortieth Congress, third session, p. 101.

[2] Same, p. 97.

[3] Parliamentary Papers, 1857, vol. 26, p. 29 (38–vii–sess. 2).

Second. There is a series of 19 sheets on tracing linen covering the entire line from the sea coast eastward to the Rocky Mountains. These sheets are numbered from west to east, 1 to 19. Each sheet except the first embraces 30′ of longitude and from 15′ to 25′ of latitude. Sheet 2, for example, includes from 123° to 122° 30′; sheet 3, longitude 122° 30′ to 122°, while sheet 19, the easternmost of the series, includes longitude 114° 30′ to 114°. The relief is shown by broken horizontal curves. The scale is not stated, but the parallels and meridians enable us to infer that it is 1:64000, or about 1 mile to 1 inch. These sheets bear no title, no legend, no date, and no names.

Third. There is a series of five manuscript maps (not numbered) on a scale of 1:120000, showing the entire line from the sea coast to the Rocky Mountains. They appear to be unfinished drafts. Relief is shown by contours in green, trails in red, and there are a few names. They are drawn on backed drawing paper. None of them have legends or titles, or names of draftsmen or any authority. They contain no dates. They appear to be compilations from original sketches, notes, and surveys. They are not numbered. Beginning at the west end of the line, the sheets cover the following areas: The first sheet covers from latitude 48° 40′ to 49° 25′, and from longitude 123° 20′ to 120° 50′, being 30 inches high and 61 inches wide. The second sheet covers from latitude 48° 33′ to 49° 35′, and from longitude 121° 15′ to 119° 12′, being 38 inches high and 50 inches wide. The third sheet covers from latitude 48° 30′ to 49° 18′, and from longitude 119° 35′ to 117° 40′, being 29 inches high and 50 inches wide. The fourth sheet covers from latitude 47° 35′ to 49° 10′, and from longitude 117° 50′ to 114° 40′, being 59 inches high and 55 inches wide. Owing to its inconvenient size this sheet has been cut into two pieces along the parallel of 48° 21′. The meridians are erroneously numbered. The fifth sheet covers from latitude 48° 15′ to 49° 35′, and from longitude 116° 08′ to 113° 13′, being 50 inches high and 71 inches wide. This map also has been cut into two pieces along the meridian of 114° 55′. Like the preceding, the meridians are erroneously numbered. Owing to its size, this roll of maps is not kept with the other material in the chests above mentioned.

Fourth. There is an unfinished manuscript map, in two sheets, on unmounted drawing paper, covering the entire line from the sea coast to the Rocky Mountains. It includes latitude 47° to 50° and longitude 113° 30′ to 125°, is on the conic projection, and is projected on the one hundred and nineteenth as the central meridian. The eastern part includes longitude 113° 30′ to 119°, the western 119° to 125°. The scale is not stated, but appears to be 1:601000. There is no title, no date, no signature. It is an outline map, no relief being shown. The camps are shown, but the boundary monuments are not.

Fifth. The foregoing four groups I have called preliminary maps. There is, however, a fifth group, a set of seven tracings, which have an official character which places them in a different category. These seven tracings, on tracing linen, are on a scale of 1 : 120000, are numbered from west eastward, and each sheet includes 1° 20′ of longitude and 30′ of latitude, being 15′ on each side of the forty-ninth parallel. Sheet 1, the westernmost, includes longitude 123° 10′ to 121° 50′; sheet 2, 121° 50′ to 120° 30′, and so on; and sheet 7, the easternmost, 115° 10′ to 113° 50′. On these maps are shown trails, camps, caches, monuments, and names; the relief also is shown by red contour lines.

Sheet 1 has the following legend:

> Tracings numbering from 1 to 7, showing the topography, names, and scales adopted by the British and United States Boundary Commissions for their final maps. By order of the commissioners.
>
> R. W. Haig,
> *Capt'n R'l Art'y, Astr. British Commis'n.*
> G. Clinton Gardner,
> *Ass't Astr. and Surv., U. S. B. C.*
>
> Washington City, *May 30, 1863.*

Final drawings.—The final original manuscript maps resulting from the survey are thirteen in number. To this should be added the title page, making fourteen drawings. They are beautifully drawn on "smooth antiquarian" drawing paper, backed with muslin, and bound with blue braid. The sheets are of uniform size, being 30 inches high and 42 inches wide. They are kept among the treaty maps in the library of the Department of State. They are drawn wholly in black and show trails, timber, camps, monuments, etc. Topography is shown by hachures. The scale of the ten detailed maps is 1: 120000, or 1.89 miles to 1 inch; of the two general maps 1: 720000, or 11.37 miles to 1 inch, and of the index map 1: 1200000, or 18.94 miles to 1 inch. This series of drawings was obviously planned to form an atlas. Of this the contents would be:

1. Title.
2. Index map showing location of ten detailed sheets.[1]
3. General map, eastern section.
4. General map, western section.
5. Detailed sheets numbered 1 to 7 (from east to west), showing land boundary.
6. Detailed sheets numbered 8 to 10, showing water boundary.

The title is as follows:

> Maps of the Boundary between the United States and the British Possessions as established by the treaty of Washington, June 15, 1846. Surveyed under the direction of the Joint Commission appointed to carry into effect the First Article of the Treaty.

The index map is entitled:

> Index Map showing the limits of the detailed sheets of the U. S. North Western Boundary Survey.

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[1] The plate which accompanies this bulletin is a copy, on a reduced scale, of this map.

The general map (western section) has outside the border the legend "U. S. North West Boundary Survey, Archibald Campbell, U. S. Commissioner; John G. Parke, U. S. Eng., Chief Astr. and Surveyor." The title is as follows:

> Map of Western Section. From notes by John G. Parke, U. S. Engineers, Chief Astr. and Surveyor, G. Clinton Gardner, Ass't Astr. and Surveyor, and Jas. S. Harris, Henry Custer, Chas. T. Gardner, George Gibbs, Francis Hudson and R. V. Peabody, Ass'ts U. S. Boundary Survey.
>
> Compiled and drawn by Lemuel D. Williams, Theodor Kolecki, and Edward Freyhold. By order of U. S. Commissioner. (Signed) G. Clinton Gardner, Ass't Astr. and Surveyor, U. S. Boundary Survey, Office Washington D. C. 1866. Scale 1:720000 or 11.37 miles to one inch.

This map includes from longitude 118° to 125,° and the eastern section, bearing a similar title, includes from longitude 110° to 118°.[1]

The detailed sheets showing the land boundary, numbered 1 to 7, are signed "Jno. G. Parke, Major of Engrs., Brevet Major General, U. S. A., Chief Astr. and Surv. Archibald Campbell, U. S. Commissioner, etc. etc. etc. and J. S. Hawkins, Colonel R'l Eng'rs., H. B. M. Commissioner." The date of signing is recorded as May 7, 1869.

The detailed sheets showing the water boundary, numbered 8 to 10, have no titles, but each has the following written upon it: "That part of the boundary line described in the treaty of June 15, 1846, between the continent and Vancouver Island not agreed upon by the Joint Commission." These are signed by John G. Parke and Archibald Campbell. They do not bear the signature of any member of H. B. M. Commission. The date of signing is November 3, 1869.

Of these final maps, the seven detailed sheets showing the land boundary have been photolithographed and a small edition printed. Just when they were printed or how large the edition I have not learned. These photolithographs are on double the scale of the original (i. e., 1:60000). They were printed by the New York Lithographing, Engraving, and Printing Company, Julius Bien, superintendent. The sheets are numbered from east to west, and the seventh or westernmost bears the following title:

> Photo-lithographic Copy of the detailed maps of the North West Boundary from Point Roberts to the Rocky Mountains between the United States and the British Possessions under the Treaty of June 15th, 1846, showing Monuments, Cuts, and other Marks. Archibald Campbell, U. S. Comr. N. W. Boundary Survey. Scale 1:60000 (enlarged to twice the scale of original drawings). Photo-lith. by New York Litho'g Engrav'g and Print'g Co., Julius Bien, Sup't.

The sheets are printed wholly in black, are 28 inches high by 71 inches wide and printed in two pieces. Relief is shown by hachures and timber by the usual convention. Boundary marks are shown by

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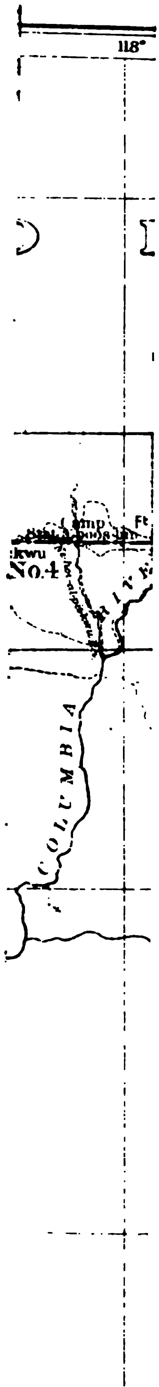
[1] In the library of the Coast and Geodetic Survey I have seen a photograph of this western sheet. It is a pale and faded copy, 18 by 24 inches, was made by Alexander Gardner, and is on a scale of 1:1070000, or about 17 miles to 1 inch.



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black circles unaccompanied by names or any designations. Of these maps I have seen copies in the Library of Congress, in the Geological Survey, in the General Land Office, in the Office of the Chief of Engineers, and in the State Department. Some of these are numbered and others not. Could there have been two editions? These sheets cover less territory than the originals. They show the belt of topography, but omit the signatures and legends, if indeed there were any on the copy furnished the lithographer. The copy in the State Department has a clear, strong red line along portions of the boundary and under the title (sheet 7) has the following in the draftsman's hand:

> NOTE.—The red lines indicate the portions of the boundary actually surveyed and marked by vistas cut through the forest and monuments of stone.

In the General Land Office there is a photographic copy of the detailed sheets dated 1866, on which are lines similar to the red ones above mentioned. As to this photographic copy we have the following statement made by Mr. Campbell in a letter to the Secretary of State, dated February 3, 1869:[1]

> In collating the results of the survey * * * complete maps on a large scale [were] made of the entire boundary and the adjacent country. A general map has also been made, showing the extent of the country traversed. And to facilitate the survey of the public lands, photographic duplicates of the detailed sheets showing each monument on the boundary line, with its geographical position, were furnished to the General Land Office.

I have examined these photographs in the General Land Office. There are four of them, each 20 by 70 inches in size, and each composed of several separate photographs, which have been joined together, mounted on cloth, and bound with blue braid. A special title was prepared and photographed for each of these four maps. The title of the easternmost sheet is as follows:

> Photographic Sketch of the detailed Maps of the Boundary between the United States and the British Possessions, showing the Monuments *from Mooyie and Yah'k Divide to Rocky Mountain Divide*. Mapped under the direction of the United States North West Boundary Commission. From Surveys by the Joint Commission to carry into effect the 1st Article of the Treaty between the United States and Great Britain and authorized on the part of the United States by Act of Congress of August 11th 1856.
>
> Archibald Campbell, U. S. Commissioner.
> John G. Parke, U. S. Eng., Chief Astr. and Surveyor.
> G. Clinton Gardner, Ass't Astr. and Surveyor.
> William J. Warren, Secretary.
> John J. Major, Clerk.
> Scale 1: 120000. 1866.

The titles of the others are identical with this, except as to the country covered. This easternmost sheet embraces longitude 113° 45′ to 116°, *from Mooyie and Yah'k Divide to Rocky Mountain Divide;*

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[1] House Ex. Doc. No. 86, Fortieth Congress, third session, p. 96.

the next, longitudes 116° to 118½°, *from Inchuintum River to Mooyie and Yah'k Divide;* the next longitudes, 118½° to 121°, *from Divide of Cascade Mountains to Inchuintum;* and the last, longitudes 121° to 123¼°, *from Point Roberts to Divide of Cascade Mountains.*

The geographic positions of the various camps, stations, etc., are given on these maps, as are also the longitudes of the boundary monuments, accompanied by brief descriptions of the locations. These positions, classified in two groups and arranged in order of longitude, are printed on pages 28–39 of this bulletin.

The preparation of the 13 final original drawings was apparently begun in 1863. There is an autograph memorandum by Mr. G. Clinton Gardner, dated June 30, 1863, containing an estimate of the time required to make these drawings. He estimates that the drawing of seven sheet of 1:120000 scale will take eighty-two weeks' work, and that two sheets of the general map of 1:720000 scale thirty-five weeks' work. After discussing methods and costs he adds:

> The scale spoken of by the English commissioner for the general map was 1:600000, but that scale would require larger sheets than those used for the detailed maps. I have therefore proposed to use for the general maps 1/6 instead of 1/5 of that of the detailed maps in order that all the sheets shall be of uniform size.

As to the drawing of these sheets and their cost, there are three memorandums in the handwriting of Mr. Gardner. The first, undated, is as follows:

Seven detail sheets from Point Roberts to Rocky Mountains, at $600	$4,200
The water-boundary sheet	1,800
The two general sheets, one from Columbia River west	1,500
And the other from Columbia east to Fort Benton	1,000
	8,500

The second memorandum, dated October 31, 1864, is as follows:

The seven detail sheets have cost $4,085, [and] when completed [will cost] $115 [more]	$4,200
The general sheets have cost $1,867, [and] when completed [will cost] $813 [more]	2,500
The water-boundary sheet has cost $750, [and] when completed [will cost] $925 [more]	1,675
Total	8,375

The third memorandum, dated January 1, 1865, is as follows:

Water-boundary sheet	$2,000
Detail sheets, 7 at $600	4,200
General maps, No. 1, $1,800; No. 2, $1,400	3,200
Total cost of the drawing of maps	9,400

Thus it appears that the drawing of these maps was completed late in 1864 or early in 1865. The photographic copy of them in the General Land Office is dated 1866.

The drawing was done by Edward Freyhold, of No. 44 Sharp street, Baltimore, by L. D. Williams, and by Theodor Kolecki. Freyhold did the "hill work"—i. e., the hachures—and the others the outline, lettering, etc. Prior to February, 1864, Freyhold had drawn the hill work on detail sheets 3 and 7.

Among the papers is an unexecuted contract (apparently the original draft) between the United States Northwestern Boundary Commission and Edward Freyhold, whereby Freyhold agrees to draw the hill work on sheets 1, 2, 4, 5, and 6 "similar and not inferior to certain other work executed by him on sheets 3 and 7" for $1.75 per square inch, and to complete the work "before the 31st day of August, 1864."

Sheet 4 was finished March 5, 1864, and contained 214½ square inches of hill work; sheet 6 was finished April 26, 1864, and contained 249½ square inches of hill work; sheet 5 was finished June 6, 1864, and contained $137\frac{5}{16}$ square inches of hill work; sheet 2 was finished August 13, 1864, and contained $225\frac{1}{64}$ square inches of hill work. There is no record as to No. 1, but it is probable that it was finished on March 5, so that the hill work was all completed by August 13 and the drawing of the final maps completed about the beginning of the year 1865.

BRITISH MAPS.

On June 23, 1871, Sir Edward Thornton, then British minister in Washington, sent to the Department of State an atlas comprising maps, views, and tables of geographic positions of the northwest boundary. This atlas is entitled:

> Maps of the land boundary between the British possessions in North America and the United States as established by the treaty of Washington, 15th June, 1846, and surveyed and marked under the direction of the Joint Commission appointed to carry into effect the 1st article of the treaty. Scale 1:120000, or 1.8939 statute miles to one inch. Photo-zincographed at the ordnance survey office, Southampton, under the superintendence of Cap't. Parsons, R. E., F. R. A. S.; Col. Sir Henry James, R. E., F. R. S., etc., director, 1869.

Then follows:

(a) An index map composed of two double-page sheets on a scale of 1:600000.

(b) Seven detailed sheets, scale 1:120000, numbered 1 to 7 from west to east. All are dated May 7, 1869, and signed by J. S. Hawkins, H. B. M. Comm'r, Archibald Campbell, U. S. Comm'r, Samuel Anderson, Lt. R. Eng'rs Secretary for Captain Haig, R. A., Chief Astronomer. Sheets 1 and 7 were drawn by J. Carroll, 2 by H. Walthouse, and 3, 4, 5 and 6 by F. B. Grose.

(c) A title page for another series of six sheets on the mile scale is as follows:

> Maps of the land boundary between the British possessions in North America and the United States as established by the treaty of Washington 15th June, 1846, and

surveyed and marked under the direction of the Joint Commission appointed to carry into effect the 1st article of the treaty. Scale of 1:63360 or one statute mile to one inch. Photo-zincographed at the ordnance survey office under the superintendence of Captain R. M. Parsons, R. E., F. R. A. S.; Col. Sir H. James, R. E., F. R. S., etc., director, 1869.

The six sheets following this are numbered 1 to 6, from west to east, and are signed "J. S. Hawkins, colonel, Royal Engineers, H. B. M. commissioner, 7th May, 1869." The geographic coordinates of camps and stations are given; topography is shown by hachures, trails are shown in brown, and water in blue. Iron monuments are shown by a square symbol (■) and stone monuments by a round one (●). The vistas and cleared part of the line appear to be indicated by two lines, one down on each side of the parallel, thus, ———==========———.

(d) Between the title of the mile scale sheets and the sheets themselves are two double pages, the first containing ten photographic views of monuments and vistas, as follows:

Initial monument, stone obelisk, Point Roberts, four views, one of each face.
Boundary monument, Mooyie River.
Boundary monument and cutting, Kootenay East.
Boundary monument and cutting, Yak'h River.
Boundary monument and cutting, Kish-e-nehn.
Boundary monument, watershed Rocky Mountains, looking north.
Boundary monument, watershed Rocky Mountains, looking south.

The second double page contains two tables of geographic coordinates, with descriptions of stations. These tables are printed in this bulletin, pages 29, 31, 33, 35, 37, and 39.

According to these tables there are 161 monuments, marking parts of a boundary line 410 miles long. These are:

Stone obelisk	1
Iron pillars	42
Pyramids of stones	3
Bench marks	2
Mound of earth	1
Piles of stones	112
Total	161

(e) Lastly we have this double title page:

Maps to illustrate the boundary line established by the convention of London, 20th October, 1818, and the treaty of Washington, 15th June, 1846, between the British Possessions in North America and the United States, compiled from the following authorities:

* * * * * * *

Scale of .0528 inches to 1 statute mile, or 1:1200000. Photozincographed, etc. 1869.

This is followed by three double-page photographic maps showing the country between the forty-fifth and fifty-first parallels of north latitude and from the Pacific Ocean eastward to Minnesota.

GEOGRAPHIC COORDINATES.

The geographic positions of various camps and stations in the vicinity of the parallel were determined astronomically. Latitudes were determined with the zenith telescope; azimuth and time with the transit. Longitudes were determined by chronometer, by moon-culminating stars, and at one station, Camp Mooyie, by the solar eclipse of July 7, 1860.

It would seem that 28 fundamental or base stations were established near the boundary. For these stations measurements were made to the parallel. Thereupon other stations, with monuments, were established on the parallel.[1] Of these stations on the parallel there are 161. The description of these fundamental or base stations and of the 161 stations on the parallel, their location, longitude, etc., are given in Tables I to IV herewith. Tables I and III are made up from data on the photographic copies of the final map which were deposited in the General Land Office in 1866. Tables II and IV are copied from the British atlas in the State Department, which was presented by the British minister, Sir Edward Thornton, in 1871. The results from the two sources are almost identical, but as they are not absolutely so, and as the originals are not conveniently accessible, it was deemed best to print, side by side, the results from these two sources.

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[1] For method employed see Appendix A, pp. 64-65.

TABLE I.—*Geographical coordinates of camps, stations, etc.*

FROM AMERICAN SOURCES.

No.	Station.	Latitude.			Longitude.		
		°	′	″	°	′	″
1	Camp Akamina	49	00	52.2	114	03	34
2	Camp Kishenehn	49	00	02.6		21	09
3	Ford of Flathead River	48	57	01.1		24	26.6
4	Junction of trail to Wigwam Station	48	55	31.4		43	33.7
5	Wigwam Station	48	59	42.8		45	02
6	Camp Kootenay East	48	59	44.4	115	11	19.2
7	Yahk'h Station	48	59	55.4		38	51
8	Camp Mooyie	49	01	25.6	116	12	40.5
9	Mooyie trail monument	49	00	01.3		14	59.2
10	Acklew Cache, junction of trails	48	54	21.4		22	02.1
11	Camp Kootenay West	48	59	54.9		31	16.2
12	Kootenay Mountain Station	49	00	12.8	117	10	48.4
13	Pend d'Oreille Station	49	00	03.5		21	52.9
14	Fort Shepherd Station	49	00	00		37	19.4
15	Camp Columbia	48	59	49.1		37	41.8
16	Camp Statapoostin	49	00	13.96	118	16	15.6
17	Inchuintum Station	48	59	58.5		28	12.3
18	Camp Neholalpitkun	48	59	02.9		44	28.5
19	Camp Osoyoos or Osoyoos Station	48	59	56.4	119	24	12
20	Camp Similkameen	48	59	12.0		34	53.2
21	Nais-nu-loh Station	48	59	52.9	120	00	18.8
22	Junction of trails, Naisnuloh	49	07	54.8		00	59.9
23	Camp Pa-say-ten	48	59	42.2		32	12.8
24	Junction of trails, Pa-say-ten Valley	49	09	38.8		33	38.9
25	Roche Station	48	59	49.8		39	14.8
26	Camp Skagit	49	00	01.8	121	02	45.2
27	Crossing of Skagit River on trail	49	07	42.7		08	29.2
28	Camp Chuch-che-hum	49	00	03.5		16	41.4
29	Camp Chiloweyuck	49	00	21.9		23	41.8
30	En-saw-kwatch Station	49	00	30		30	41.8
31	Sen-ch-say Station	49	00	34.3		36	15.4
32	Camp Tummeahai	49	02	04.9		47	34.4
33	Intersection of Whatcom and Lake trails	48	06	05.4		54	56.8
34	Chiloweyuck Depot	49	09	28.2		57	59
35	Camp Sumass	49	01	25.8	122	11	52.8
36	British Station	49				37	01.6
37	Camp Simiahmoo	49	00	43.1		45	30
38							

TABLE II.—*Geographical coordinates of camps, stations, etc.*

FROM BRITISH SOURCES.

No.	Station.	Latitude.			Longitude.		
		°	′	″	°	′	″
1	Camp Akamina and Station	49	00	52.0	114	03	34.0
2	Camp Kish-e-nehn	49	00	02.8	114	21	09.0
3							
4							
5	Wigwam Station	48	59	42.8	114	45	02.0
6	Camp Kootenay East	48	59	44.6	115	11	19.2
7	Yahk'h Station	48	59	55.4	115	38	57.0
8	Camp Mooyie	49	01	26.0	116	12	40.5
9							
10							
11	Camp Kootenay West	48	59	55.1	116	31	16.2
12	Kootenay Mountain Station	49	00	12.8	117	10	48.4
13	Pend d'Oreille Station	49	00	03.5	117	21	52.9
14	Fort Shepherd Station	49	00	00.0	117	37	19.4
15	Camp Columbia	48	59	50.4	117	37	41.8
16	Camp Stat-a-poos-tin	49	00	10.8	118	16	15.6
17	In-chu-in-tum Station	48	59	58.5	118	28	12.3
18	Camp Ne-hoi-al-pit-kwu	48	59	04.3	118	44	28.5
19	Camp O-so-yoos & O-so-yoos Station	49	00	00.9	119	24	12.0
20	Camp Simil-ka-meen	48	59	12.1	119	34	58.2
21	Nais-nu-loh Station	48	59	58.9	120	00	18.8
22							
23	Camp Pa-say-ten	48	59	42.6	120	32	12.8
24							
25	Roche Station	48	59	49.8	120	39	14.8
26	Camp Skagit	49	00	02.3	121	02	45.2
27							
28	Camp Chuck-che-hum	49	00	03.7	121	16	41.4
29	Camp Chiloweyuck	49	00	22.2	121	23	41.8
30	En-saw-kwatch Station	49	00	30.0	121	30	41.8
31	Sen-eh-say Station	49	00	34.8	121	36	15.4
32	Camp Tummeahai	49	02	04.9	121	47	34.4
33							
34							
35	Camp Sumass and Station	49	01	25.8	122	11	52.8
36	British Station	49	00	00.0	122	43	59.9
37	Camp Simiahmoo Observatory	49	00	43.1	122	45	30.0
38	Obelisk at Initial Point	49	00	00.0	123	03	53.0

TABLE III.—*Locations and longitudes of the boundary monuments.*

FROM AMERICAN SOURCES.

No.	Location of monument.	Longitude.
		° ′ ″
1	Divide of Rocky Mountains	114 03 28.4
2	Left bank of Kishenehn Creek	20 53.9
3	Near trail entering Boundary Pass	21 17.3
4	Second terrace, left bank of Flathead River	27 09.4
5	First bench, right bank of Flathead River	28 02.5
6	West bank of river	45 16.1
7	Hillside, west of river	45 42
8	Small creek, foot of mountain	115 08 28.7
9	Second plateau, left bank of river	10 11.6
10	Right bank of river	11 11.2
11	Brink of ravine, base of mountain	16 01.4
12	Side of hill	38 02.8
13	Ridge of hill	38 29.1
14	Flat, east side of river	39 10.5
15	Flat, west side of river	39 24.5
16	Flat, west of river	39 46.5
17	High bluff, left bank of creek	*a*116 11 24
18	Left bank of creek, water's edge	11 25.6
19	Plateau above creek	*a*11 54
20	Side of mountain, west side of valley	12 22.3
21		
22	Brow of first hill, right bank of river	31 05.9
23	Mountain slope, west side of valley	35 44.9
24	Bench, west side of river	117 08 55.9
25	Mark on face of rock on hillside	09 56.5
26	Right bank of river, meridian of Pend d'Oreille Station	21 52.9
27	Bench, west side of river	22 03
28	Sharp ridge, west side of river	22 54.8
29	Near east bank of river	36 59.4
30		
31	On brink of hill, west bank of river	37 36.2
32	On hilltop, west of Camp Columbia	38 49.1
33	On ridge	41 17.7
34	.....do	45 49.5
35	On ridge between streams	53 08.1
36	.....do	59 00.9
37	On slope of hill between streams	118 01 52.2
38	On slope of hill east	03 17.1
39	On hill between streams	05 15.8
40	On hill west side of stream	09 26

a Approximate.

TABLE IV.—*Locations, longitudes, and descriptions of the boundary monuments.*

FROM BRITISH SOURCES.

No.	Location of monument.	Longitude.	Description.	From what station determined.	No. in British Atlas.
		° ′ ″			
1	On the divide of the Rocky Mountains.	114 03 28.41	Pile of stones.	Camp Akamina and Station.	161
2	On left bank of Kishenehn Creek..	20 53.9	.....do........	Camp Kishenehn.	160
3	Near trail entering Boundary Pass.	21 17.3	.....do........	.....do............	159
4	On first bench, right bank Flathead River.	27 09.4	.....do........	.....do............	158
5	On second terrace, left bank Flathead River.	28 02.5	.....do........	.....do............	157
6	Near west bank of river............	45 16.1	.....do........	Wigwam Station .	156
7	On hill west of river	45 42.0	.....do........	.....do............	155
8	At foot of mountains, left bank small creek.	115 03 28.7	.....do........	Camp Kootenay East.	154
9	On second plateau, left bank river.	10 11.6	.....do........	.....do.........•..	153
10	On right bank Kootenay River	11 11.2	.....do........	.....do............	152
11	On east brink ravine beyond which the mountains rise.	16 01.4	.....do........	.....do............	151
12	On hillside east of river............	38 02.8	.....do........	Yahk'h Station...	150
13	.....do..............................	38 29.1	.....do........	.....do............	149
14	Near east bank of river	39 10.5	.....do........	.....do............	148
15	On west side of river...............	39 24.5	.....do........	.....do............	147
16	.....do..............................	39 46.5	.....do........	.....do............	146
17	On high bluff, left bank............	[a]116 11 24	.....do........	Camp Mooyie.....	145
18	On left bank of creek close to water.	11 25.6	.....do........	.....do............	144
19	On plateau above creek............	[a]11 54	.....do........	.....do............	143
20	On side of mountain, west side of valley.	12 22.3	.....do........	.....do............	142
21	On trail leading from the north to Cholemta.	14 59.2	.....do........	.....do............	141
22	On brow of first hill, right bank river.	31 05.9	.....do........	Camp Kootenay West.	140
23	On side of mountain, west side of valley.	35 44.9	.....do........	.....do............	139
24	On bench, west side, South Fork Salmon River.	117 08 55.9	.....do........	Kootenay Mt. Station.	138
25	On face of rock on ridge east.......	09 56.5	Bench mark.. ↑	.....do............	137
26	Latitude mark, Pend d'Oreille Station.	21 52.9	Pile of stones.	Pend d'Oreille Station.	136
27	On bench, west side of river........	22 03	.....do........	.....do............	135
28	On high ridge west	22 54.8	.....do........	.....do............	134
29	Near east bank of Columbia River.	36 59.4	.....do........	Fort Shepherd Station.	133
30	Near east bank of river	37 05.2	.....do........	Camp Stat-a-poos-tin.	132
31	On brink of hill, west bank Columbia River.	37 36.2	.....do........	.....do............	131
32	On hilltop, west of Camp Columbia.	38 49.1	.....do........	.....do............	130
33	On side of hill between streams....	41 17.7	.....do........	.....do............	129
34	.....do..............................	45 49.5	.....do........	.....do............	128
35	.....do..............................	53 08.1	.....do........	.....do............	127
36	.....do..............................	59 00.9	.....do........	.....do............	126
37	On slope between streams..........	118 01 52.2	.....do........	.....do............	125
38	.....do..............................	03 17.1	.....do........	.....do............	124
39	On hill between streams...........	05 15.8	.....do........	.....do............	123
40	On hill west side of stream.........	09 26.0	.....do........	.....do............	122

[a] Approximate.

TABLE III.—*Locations and longitudes of the boundary monuments*—Continued.

FROM AMERICAN SOURCES—Continued.

No.	Location of monument.	Longitude.
		° ′ ″
41	Side of mountain east of river	118 09 58.4
42	Gravel bench west of river	11 56.1
43	Near the trail to Colville	13 19.1
44	Point of ridge at bend of valley	14 21.0
45	North slope of mountain south of river	16 36.
46	High ridge south of river	18 45.4
47	High ridge south of Neholalpitkwu River	21 36.8
48	.....do	22 18.6
49	In valley at base of mountain, south	24 07.2
50	.....do	25 38.2
51	In valley south of Neholalpitkwu River	26 32.6
52	In valley east of Colville trail	27 40.8
53	Near edge of first plateau	28 40.8
54	First plateau west of river	29 48.7
55	First bench west of small creek	31 28.4
56	Summit between creeks	33 43
57	Divide in bend of the Neholalpitkwu River	36 43.4
58	Sharp ridge between creeks	38 24.9
59	Northern slope of mountain	39 51.5
60	.....do	40 57.2
61	Open country east of Rock Creek	41 49.6
62	.....do	42 38.4
63	.....do	43 24.5
64	East of Colville trail	44 13.8
65	Foot of mountain, right bank of Neholalpitkwu River	45 12.6
66	Point of ridge in bend of river	45 48.9
67	.....do	46 45.6
68	Foot of mountains south side of valley	48 27.3
69	Point of hill south of creek	51 14.9
70	Ridge between two creeks	52 26.6
71	.....do	53 06.6
72	.....do	55 05
73	.....do	55 58.2
74	Summit east of wagon road	56 58.9
75	In valley east of wagon road	59 33.6
76	High plateau south of Rock Creek	119 01 23
77	.....do	02 54.9

TABLE IV.—*Locations, longitudes, and descriptions of the boundary monuments*—Cont'd.

FROM BRITISH SOURCES—Continued.

No.	Location of monument.	Longitude.	Description.	From what station determined.	No. in British Atlas.
		° ′ ″			
41	On side of mountain east of Nehoialpitkwu River.	118 09 58.2	Pile of stones.	Camp Stat-a-poostin.	121
42	On a gravel ridge west of river	11 56.1	.....do	.....do	120
43	In valley near trail to Colville	13 19.1	.....do	.....do	119
44	On point ridge right side of valley.	14 21.0	.....do	.....do	118
45	On north slope of mountains south of river.	16 36.7	.....do	In-chu-in-tum Station and Camp Stat-a-poos-tin.	117
46	On high ridge south of river	18 45.4	.....do	.....do	116
47	.....do	21 36.8	.....do	.....do	115
48	.....do	22 18.6	.....do	.....do	114
49	In valley of Nehoialpitkwu south of river.	24 17.2	.....do	.....do	113
50	.....do	25 38.2	.....do	.....do	112
51	.....do	26 32.6	.....do	.....do	111
52	In valley near and east of Colville trail.	27 40.8	.....do	.....do	110
53	On first plateau west of river	28 40.8	.....do	Camp Ne-hoi-al-pit-kwu and In-chu-in-tum Station.	109
54	.....do	29 48.7	.....do	.....do	108
55	On first bench west of small creek	31 28.4	.....do	.....do	107
56	On summit between two creeks	33 43.0	.....do	.....do	106
57	On devide between Rock Creek and Nehoialpitkwu.	36 43.4	.....do	.....do	105
58	On sharp ridge between heads of tributary of Rock Creek.	38 24.9	.....do	.....do	104
59	On southern slope of mountain	39 51.5	.....do	.....do	103
60	.....do	40 57.2	.....do	.....do	102
61	In open country east of Rock Creek.	41 49.6	.....do	.....do	101
62	.....do	42 38.4	.....do	.....do	100
63	.....do	43 24.5	.....do	.....do	99
64	East of and near Colville trail	44 13.8	.....do	.....do	98
65	At foot of mountain, right bank of Nehoialpitkwu River.	45 12.6	Mound of earth.	Camp Osoyoos and Camp Ne-hoi-al-pit-kwu.	97
66	On point of ridge in bend of Nehoialpitkwu River.	45 48.9	Pile of stones.	.....do	96
67	On point of ridge in bend of Nehoialpitkwu.	46 45.6	.....do	.....do	95
68	In valley of Nechoialpitkwu	48 27.3	.....do	.....do	94
69	On point of ridge south and east of creek.	51 14.9	.....do	.....do	93
70	On ridge between two creeks	52 26.6	.....do	.....do	92
71	On same ridge	53 06.6	.....do	.....do	91
72	.....do	55 05.0	.....do	.....do	90
73	.....do	55 58.2	.....do	.....do	89
74	On summit east of wagon road to Rock Creek.	56 58.9	.....do	.....do	88
75	In valley east of wagon road to Rock Creek.	59 33.6	.....do	.....do	87
76	On high plateau south of Rock Creek.	119 01 23.0	.....do	.....do	86
77	.....do	2 54.9	.....do	.....do	84

TABLE III.—*Locations and longitudes of the boundary monuments*—Continued.

FROM AMERICAN SOURCES—Continued.

No.	Location of monument.	Longitude.
		° ′ ″
78	High plateau south of Rock Creek	119 04 36
79	Rocky ledge east of small lake	06 15
80	Summit east of creek	08 02.8
81	West bank of creek	09 32.8
82	First bench west of creek	10 18.4
83	Slope of hill north of small lake	11 56.5
84	South and east of Colville trail	14 27.2
85	North and west of small creek	17 10.4
86	Spur from mountain to the north	18 58.1
87	.....do	21 26.4
88	Summit of first ridge east of the valley	22 37.6
89	East side of Osoyoos Valley	24 08.9
90	West side of Osoyoos Valley	26 04.5
91	Plateau north of Similkameen River	28 48
92	.....do	29 52.6
93	Southern slope of rocky knoll	33 24
94	Ridge east of trail	36 14.6
95	Near trail	37 45.9
96	Isolated mountain east of Similkameen River	39 56.6
97	Left bank of Similkameen River	40 32.7
98	Foot of mountains west side of Similkameen Valley	42 20.9
99	Flat east side of swamp	58 38.7
100	Near small stream	59 57.9
101	Sharp ridge west side of stream	120 00 46.1
102	Bench east side Pa-say-ten Valley	32 00.9
103	Slope west side Pa-say-ten Valley	32 29.3
104	Hillside east of Chuchuwanten River	38 51.9
105	Hillside west of Chuchuwanten River	39 47.2
106	Bench of hill east side of Skagit Valley	121 02 26.6
107	Slope of mountain west side of Skagit Valley	04 22.2
108	Base of mountain south of camp	16 41.4
109	West of and near trail to Skagit	16 56.3
110	East of and near trail to Skagit	18 57.3
111	East side of Klahaihu Valley	28 11
112	West side of Klahaihu Valley	28 48.5
113	East of river	30 08.4
114	On rock west of river	30 21.2

TABLE IV.—*Locations, longitudes, and descriptions of the boundary monuments*—Cont'd.

FROM BRITISH SOURCES—Continued.

No.	Location of monument.	Longitude.	Description.	From what station determined.	No. in British Atlas.
		° ′ ″			
78	On high plateau south of Rock Creek.	119 4 36.0	Pile of stones.	Camp Osoyoos and Camp Ne-hoi-al-pit-kwu.	85
79	On rocky ridge east of small lake ..	6 15.0	.....do	.....do	83
80	On summit east of fork of Rock Creek.	8 02.8	.....do	.....do	82
81	On valley of fork of Rock Creek, west bank.	9 32.8	.....do	.....do	81
82	On first bench west of fork of Rock Creek.	10 18.4	.....do	.....do	80
83	North of small lake................	11 56.5	.....do	.....do	79
84	Southeast of Colville trail	14 27.2	.....do	.....do	78
85	North and west of small creek	17 10.4	.....do	.....do	77
86	On spur from mountain to the north.	18 58.1	.....do	.....do	76
87	.....do	21 26.4	.....do	.....do	75
88	Summit of first ridge east of Lake Osoyoos.	22 37.6	.....do	.....do	74
89	East of trail up east bank of Lake Osoyoos.	24 08.0	.....do	.....do	73
90	West of trail up west bank of Lake Osoyoos.	26 04.5	.....do	Camp Similkameen and Camp Osoyoos.	72
91	Near divide between Osoyoos and Similkameen and near junction of trail.	28 48.0	.....do	.....do	71
92	On plateau north of Similkameen..	29 52.6	.....do	.....do	70
93	On southern slope of a rocky knoll.	33 24.0	.....do	.....do	69
94	On summit of ridge east of trail up Similkameen.	36 14.6	.....do	.....do	68
95	East of and near trail up Similkameen.	37 45.9	.....do	.....do	67
96	On summit of isolated mountain of Similkameen.	39 56.6	.....do	.....do	66
97	On left bank of Similkameen	40 32.7	.....do	.....do	65
98	At foot mountains west side Similkameen Valley.	42 20.9	.....do	.....do	64
99	On flat east side of stream..........	58 38.7	.....do	Nais-nu-loh Station.	63
100	East and near to stream............	59 57.9	.....do	Nais-nu-loh Station.	62
101	On sharp ridge west side of stream.	120 00 46.1	.....do	.....do	61
102	On bench, east side of Pasayten Valley.	32 00.9	.....do	Camp Pa-say-ten.	60
103	On slope west side of Pasayten Valley	32 29.3	.....do	.....do	59
104	On hillside east of river............	38 51.9	.....do	Roche Station....	58
106	On hillside west of station	39 47.2	.....do	.....do	57
106	On side of hill east of Skagit Valley.	121 02 26.6	.....do	Camp Skagit	56
107	On side of mountain west side of Skagit Valley.	04 22.2	.....do	.....do	55
108	At foot of mountain south of camp.	16 41.4	.....do	Camp Chuch-che-hum.	54
109	West of and near trail to Skagit ...	16 56.2	.....do	.....do	53
110	East of and near trail to Skagit	18 57.3	.....do	.....do	52
111	On east side of Klahaihu Valley ...	23 11.0	.....do	Camp Chilowe-yuck.	51
112	On west side of Klahaihu Valley...	23 48 5	.....do	.....do	50
113	On east side of Ensaw-kwatch River.	30 08.4	.....do	En-saw-kwatch Station.	49
114	On west side of Ensaw-kwatch River.	30 21.2	Bench mark ↑	.....do	48

TABLE III.—*Locations and longitudes of the boundary monuments*—Continued.

FROM AMERICAN SOURCES—Continued.

No.	Location of monument.	Longitude.
		° ′ ″
115	East side of Sen-eh-say River	121 35 28.4
116	Side of mountain south of creek	42 56.3
117	.....do.	43 31.6
118	Side of mountain west of falls of creek	43 56.1
119	Whatcom trail (last iron pillar) *a*	122 04 45.2
120	Small bench east base of hill	05.26.6
121	Summit of hill east of Sumass Prairie	06 31.9
122	Bench above rocky precipice	07 21.7
123	Face of hill	07 50.4
124	Small bench west of stream	08 38.4
125	Flat east of stream	10 02.7
126	Rising ground	11 00.8
127	Meridian of Camp Sumass	11 52.8
128	East side of Sumass River	12 46.3
129	Trail west of Sumass River	12 55.2
130	Trail crossing boundary	14 01
131	Trail on sharp ridge west of swamp	15 04.1
132	Flat north of trail	16 29.1
133	Hill east of trail	18 00.6
134	East bank of small lake	19 08.9
135	Trail crossing boundary	19 55.1
136	West of swamp and north of trail	20 29.4
137	Flat north of trail	21 47.6
138	Trail crossing boundary	22 20.7
139	Trail east side of Cullam Creek	23 05.9
140	Flat south of trail	24 22.7
141	.....do	25 04.1
142	Rising ground between swamp and creek	27 19.3
143	Belt of timber between swamps	28 32.9
144	Edge of slope west of swamp	29 37.2
145	Trail west bank of Sehkomehkl Creek	30 07.9
146	Ridge west of Sehkomehkl Creek	31 05.1
147	Flat north of trail	32 13.7
148	Small ridge south of trail	33 27.7
149	Flat south of trail	34 46.7
150	Flat near stream, south of trail	36 08.5
151	Latitude mark, British station	37 01.6
152	First bench and south of trail	37 26.9

a A pencil note here says: "All iron pillars from western end to Whatcom trail—43 in all—36 given here."

TABLE IV.—*Locations, longitudes, and descriptions of the boundary monuments*—Cont'd.

FROM BRITISH SOURCES—Continued.

No.	Location of monument.	Longitude.	Description.	From what station determined.	No. in British Atlas.
		° ′ ″			
115	On east side of Sen-eh-say, or Selacee, River.	121 35 28.4	Pile of stones.	Sen-eh-say Station	47
116	On side of mountain south of creek.	42 56.3	Pyramid of stones.	Camp Tummea-hai.	46
117	.....do	43 31.6	.....do	.....do	45
118	On side of mountain west of falls of creek.	43.58.1	.....do	.....do	44
119	On De Lacy's trail, Whatcom to Fort Hope, crossing line.	122 4 45.2	Iron pillar....	Sumass Station and Camp.	43
120	On bench at base of hill	5 26.6	.....do	.....do	42
121	On top of mountain east side of Sumass Prairie.	6 31.9	.....do	.....do	41
122	On bench above rocky precipice east of trail.	7 21.7	.....do	.....do	40
123	On face of hill 5 chains from base and near trail.	7 50.4	.....do	.....do	39
124	On bench west of stream	8 38.4	.....do	.....do	38
125	On flat east of stream	10 02.7	.....do	.....do	37
126	On mound east of latitude mark...	11 00.8	.....do	.....do	36
127	Latitude mark Sumass	11 52.8	.....do	British Station ...	35
128	On east side of Sumass River	12 46.3	.....do	.....do	34
129	On Whatcom trail west side Sumass River.	12 55.2	.....do	.....do	33
130	On trail crossing boundary line....	14 01.0	.....do	.....do	32
131	On top of hill west of swamp and on trail crossing line.	15 04.1	.....do	.....do	31
132	On flat north of trail and west of swamp.	16 29.1	.....do	.....do	30
133	On hill 20 chains east of trail crossing line.	18 00.6	.....do	.....do	29
134	On east side small lake	19 08.9	.....do	.....do	28
135	On trail crossing boundary line....	19 55.1	.....do	.....do	27
136	On west side of swamp and north of trail.	20 29.4	.....do	.....do	26
137	On flat north of trail	21 47.6	.....do	.....do	25
138	On trail crossing boundary line....	22 20.7	.....do	.....do	24
139	On trail crossing boundary line east side of creek.	23 05.9	.....do	.....do	23
140	On flat south of trail	24 22.7	.....do	.....do	22
141	.....do	25 04.1	.....do	.....do	21
142	On slightly elevated ground west of creek.	27 19.3	.....do	.....do	20
143	On belt of timber between swamps.	28 32.9	.....do	.....do	19
144	On edge of slope west of stream and south of trail.	29 37.2	.....do	.....do	18
145	On trail crossing line west side of Seh-ko-mehl Creek,	30 07.9	.....do	.....do	17
146	On ridge west of Seh-ko-mehl Creek.	31 05.1	.....do	.....do	16
147	On flat north of trail	32 13.7	.....do	.....do	15
148	On ridge south of trail and stream.	33 27.7	.....do	.....do	14
149	On flat south of trail	34 46.7	.....do	.....do	13
150	On flat near stream south of trail...	36 08.5	.....do	.....do	12
151	Latitude mark, British station	37 01.6	.....do	.....do	11
152	On first bench south of trail	37 26.9	.....do	.....do	10

TABLE III.—*Locations and longitudes of the boundary monuments*—Continued.

FROM AMERICAN SOURCES—Continued.

No.	Location of monument.	Longitude.
		° ′ ″
153	Slope south of trail	122 38 45.5
154	Flat west of ravine	40 04.1
155	.....do	41 22.7
156	Small ridge between swamps	42 20.5
157	Parallel station	43 59.9
158	East side of Point Roberts	123 00 42.9
159	Ridge on Point Roberts	02 12.7
160	Flat east of Obelisk	03 02.9
161	Initial Point, Obelisk of stone	03 53

TABLE IV.—*Locations, longitudes, and descriptions of the boundary monuments*—Cont'd.

FROM BRITISH SOURCES—Continued.

No.	Location of monument.	Longitude.	Description.	From what station determined.	No. in British Atlas.
		° ′ ″			
153	On slope south of trail	122 38 45.6	Iron pillar	British Station	9
154	On flat west of ravine	40 04.1	.....do	.....do	8
155	.....do	41 22.7	.....do	.....do	7
156	On small ridge between swamps	42 20.5	.....do	.....do	6
157	Near high-water mark, Simiahmoo Bay.	43 59.9	.....do	.....do	5
158	On east side of Point Roberts	123 00 42.9	.....do	Camp Simiahmoo observatory.	4
159	On ridge	02 12.7	.....do	.....do	3
160	On flat east of Obelisk, Point Roberts.	03 02.9	.....do	.....do	2
161	On west face of Point Roberts	03 53.0	Obelisk	.....do	1

MAGNETICS.

Both the British and the American surveyors were equipped with an outfit of instruments for determining the magnetic declination, dip, and force. The British instruments were standardized at Greenwich, and the resulting elements at 23 stations, as obtained by Captain Haig, were discussed by General Sabine and published in the Philosophical Transactions. An abstract of these results is printed on page 42 of this bulletin.

As to the results by the American parties, much, unfortunately, must be left to inference, their results being, supposedly, in the "lost report." Mr. Campbell, writing in 1869,[1] says: "A magnetic survey extending over a range of 3° 20′ in latitude and 4° in longitude, with the necessary observations of the magnetic elements of the astronomical stations, was also made." The work appears to have been done by Mr. J. S. Harris, whose results were secured by the United States Coast Survey. From these it appears that the observations covered a considerably larger extent of territory than that above indicated by Mr. Campbell. The character of the instrumental outfit and its fate in the field can be inferred, in part, from the two following passages from General Parke's report of progress, written November 12, 1859: "A full set of magnetic observations were made at one station" (in 1858).[2] Also, "I am happy to report that we have got thus far through the season's work without any damage to our astronomical instruments. I regret, however, that we have been less fortunate with the magnetic instruments. The mule carrying these missed his footing and rolled down a precipitous bank. The magnetic theodolite will have to be replaced, and the other instruments will require repairing."[3]

The Coast and Geodetic Survey has furnished from its manuscript registers the following table of results for declination, dip, and intensity.

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[1] House Ex. Doc. No. 86, Fortieth Congress, third session, p. 95.

[2] Senate Ex. Doc. No. 16, Thirty-sixth Congress, first session, p. 6.

[3] Same, pp. 6–7

Declination, dip, and force for the mean epoch 1860.

[Results from observations by Joseph S. Harris, United States Northwestern Boundary Commission, 1858 to 1861. From manuscript furnished by the United States Coast and Geodetic Survey.]

Station.	Latitude.	Longitude.	East declination.	Dip.	Horizontal force.		Total force.
					Br. units.	C. G. S. units.	C. G. S. units.
	° ′	° ′	° ′	° ′			
Magnetic station	49 00	114 21	22 58	....	....	....	....
Do	48 59	115 10	22 58	....	....	....	....
Camp No. 11	49 07	115 16	....	73 37	....	....	....
Camp No. 14, Joseph Prairie	49 31	115 35	23 34	73 49	3.757	0.1732	0.6217
Magnetic station	49 00	116 33	22 37	....	....	....	....
Do	48 42	116 19	22 16	....	....	....	....
Do	48 10	116 45	21 49	....	....	....	....
Peon Prairie	47 44	117 14	21 53	72 05	4.099	0.1890	0.6146
Spokane Ferry	47 49	117 49	22 07	71 52	4.132	0.1905	0.6123
Colville Depot	48 34	117 52	22 31	72 31	3.976	0.1833	0.6100
Tukannon River	46 32	118 00	20 55	70 22	4.380	0.2020	0.6009
Lugenbeel Creek	47 09	118 06	20 55	71 19	4.229	0.1950	0.6085
Cow Creek	46 53	118 10	21 01	71 01	4.301	0.1983	0.6097
Dry Creek	46 09	118 18	20 13	70 47	4.289	0.1978	0.6007
Magnetic station	46 03	118 25	20 00	....	....	....	....
Do	49 00	118 44	22 07	....	....	....	....
Near Wallula	46 02	119 00	19 46	....	....	....	....
Camp Osoyoos	49 00	119 24	....	72 33	....	....	....
Magnetic station	49 00	119 35	23 34	....	....	....	....
Do	49 03	120 55	24 19	....	....	....	....
Skagit	49 00	121 03	....	72 40	3.933	0.1813	0.6084
Magnetic station	49 05	121 07	22 23	....	....	....	....
Camp Chiloweyuck	49 01	121 23	22 09	72 25	4.025	0.1856	0.6141
Magnetic station	48 59	121 42	22 47	....	....	....	....
Do	49 01	121 45	22 55	....	....	....	....
Do	48 59	121 57	22 39	....	....	....	....
Semiahmoo	49 01	122 46	22 55	72 01	4.094	0.1888	0.6115
Point Roberts	48 59	122 58	22 39	71 46	4.111	0.1896	0.6056

Declination, dip, and force for the mean epoch 1860.

[Abstract of results obtained by Capt. R. W. Haig, R. A., with standard instruments, between August, 1858, and August, 1861, in connection with the survey of the northwest boundary. From Philosophical Transactions of the Royal Society, 1864, vol. 154, pp. 161-166.]

Station.	Latitude.	Longitude.	East declination.	Dip.	Total force.	
					Br. units.	C. G. S. units.
	° ′	° ′	° ′	° ′		
Akamina station	49 01	114 04	22 56	73 38	13.522	0.6235
Wigwam station	49 00	114 45	22 50	73 30	.496	0.6223
Tobacco Plains (Kootenay)	48 57	115 08	....	73 24	.481	0.6216
On Kootenai River	48 40	115 17	22 36	73 09	.460	0.6206
South Crossing (Kootenay)	48 22	115 21	22 28	72 55	.443	0.6198
Chelemta	48 41	116 19	22 27	72 59	.423	0.6189
Pack River	48 22	116 28	22 19	72 43	.401	0.6179
Sinyakwateen	48 09	116 44	22 10	72 30	.288	0.6104
Chemikane River	48 00	117 45	21 57	72 12	.334	0.6148
Colville B. B. C. Barracks	48 40	118 05	22 11	72 39	.357	0.6159
Inshwointum	49 00	118 28	22 15	72 50	.361	0.6161
Osoyoos station	49 00	119 24	22 07	....	....	....
Ashtnolou station	49 00	120 00	22 12	72 34	.306	0.6135
On Ashtnolou River	49 07	120 00	22 04	....	....	....
Do	49 10	120 00	22 06	72 42	.315	0.6139
Dalles, 8-mile camp	45 40	120 49	....	69 49	.091	0.6036
Dalles, 3-mile camp	45 35	120 49	20 27	69 45	.087	0.6034
Chiluweyuk	49 02	121 23	....	72 21	.257	0.6113
Schweltza Lake	49 02	122 00	21 44	72 14	.234	0.6102
Sumass Prairie	49 01	122 12	21 42	72 11	.226	0.6098
Nisqually	47 07	122 25	20 51	70 39	.111	0.6045
Fort Vancouver	45 38	122 28	20 13	69 28	.026	0.6006
Esquimalt	48 26	123 27	21 20	71 30	.148	0.6062

ELEVATIONS.

Elevations were determined along and near the boundary by both the American and British parties throughout the progress of the survey. Most of them were measured barometrically; a few were determined by triangulation.

Among the State Department papers is a short summary or table of heights determined by the British, and a longer and incomplete list of elevations determined by the United States parties.

The British list, contained on two leaves of blue foolscap paper, is entitled: "Abstract of the principal heights determined by barometrical measurements on the line of the North American boundary in the years 1859, 60–61."

The table contains eight columns. The first gives the year; the second, name of station; third, latitude; fourth, longitude; fifth, barometer (always marked A or M, meaning probably aneroid or mercurial); sixth, number; seventh, elevation above sea level; eighth, how determined. The paper is not dated or signed. Columns 2, 3, and 7 of that table are here printed on pages 43 and 44.

The American list is entitled: "Data concerning the determination of altitudes by the U. S. N. W. Boundary Commission in the years 1857, 58, 59, and 60."

This data is contained in two cahiers, of six double sheets each, designated Vol. I and Vol. II. The first one has been revised throughout; the second one is apparently revised in part only and is incomplete. The data is in nine columns. The first gives the date "when occupied;" the second, the name of station; third, barometer (designated by number, 790, 1224, 1219, 1226); fourth, number; fifth, latitude; sixth, longitude; seventh, observer; eighth, altitude; ninth, remarks. We here print columns 2 and 9 (consolidated), 5, 6, and 8.

Elevations along the forty-ninth parallel from the Pacific Ocean to the Rocky Mountains, determined barometrically, in the years 1857–1860, by the British Northwestern Boundary Commission.

No.	Station.	Latitude.			Longitude.			Elevation.
		°	′	″	°	′	″	*Feet.*
1	River about 2 miles below lower end of Chief Mountain Lake							5,028
2	Watershed in South Kootenai Pass							6,970
3	Mountain near following station							8,454
4	End of boundary line, watershed in latitude 49°	49	0	00	114	3	25	7,524
5	Terminal latitude station	49	0	52		3	34	6,548
6	Watershed on trail below Summit Station	49	1	26		3	54	5,859
7	Mule Camp	49	3	38		7	30	5,191
8	Junction of trails south of Kootenai Pass	49	5	39		11	42	4,753
9	Flathead latitude station	49	0	00		21	06	4,136
10	Ford of Flathead River	48	57	01		24	24	4,073
11	Flathead Valley, upper terrace	48	56	18		28	40	4,267
12	Wigwam River Station	48	59	48		45	02	4,694
13	Watershed, Tobacco and Wigwam	48	57	23		45	02	5,832
14	Camp [near head of Tobacco River, homeward]	48	53	06		45	43	4,350
15	Camp near head of Tobacco River [outward]							4,858
16	Camp on Tobacco River—homeward Camp on Tobacco River—outward	48	49	04		53	52	2,998 3,103
17	Mooyie cutting	49	00	00	116	11	40	2,252
18	Crossing of Mooyie River	48	54	08		11	38	2,142
19	Second ridge west of Yakh River	48	54	17		8	30	4,466
20	First ridge west of Yakh River	48	33	55		4	00	5,791
21	High peak above following station							8,531
22	Watershed, Kootanie and Yakh rivers	48	58	13	115	25	00	7,664
23	Watershed at head of Mooyie River	49	27	00	115	46	00	2,920
24	Yakh River Station	48	59	55		38	48	2,927 2,998
25	Third crossing, Kootanie River on Tobacco plains near trading post	48	37	30		10	00	2,228 2,296 2,300
26	Second crossing, Kootanie River	48	22	01		26	30	2,136
27	Chelempta Kootanie River	48	41	15	116	34	24	1,712
28	Sinyakwateen Ferry	48	09	16		50	20	1,996
29	Lake 9 miles south of Sinyakwateen	48	00	03		52	00	2,192
30	Edge of wood, Spokane plains	48	48	35	117	00	45	2,143

Elevations along the forty-ninth parallel, etc.—Continued.

No.	Station.	Latitude.			Longitude.			Elevation.
		°	′	″	°	′	″	*Feet.*
31	Plants house	48	42	50	117	17	00	2,018
32	Little Spokan Springs	48	46	10		29	00	1,641
33	Spokan River—west bend	47	53	20		40	30	1,423
34	Chém-a-kane bridge	48	0	14	116	46	24	1,890
35	N. A. B. C. Barracks, at Colville, Columbia River	48	39	58	118	05	10	1,268 1,336
36	Fort Shepherd	49	01	05	117	36	58	1,406
37	Third boundary crossing of Colville River	48	58	26	118	13	28	1,534
38	Statapoostin Station	49	00	13		17	09	1,515
39	Camp 8¼ miles below In-chû-in-tum Station	49	00	23		25	00	1,871
40	In-chû-in-tum Station	49	00	01		30	13	1,991
41	Camp on line near Rock Creek	48	59	30	119	02	10	2,351
42	Haigs Pond	49	00	00		8	40	3,784
43	Camp Archer, near Osoyoos	48	59	50		19	05	2,880
44	Larchtree Hill	49	00	00		13	00	3,964
45	Similkameen River, near Vermilion Forks							1,597
46	Camp above Similkameen							3,031
47	Camp near Moodys Flat							4,119
48	Camp 21 miles out on road							1,652
49	Fort Hope							*a* 140
50	Osoyoos Lake	49	00	00	119	26	40	757 928 949
51	Similkameen River							1,180
52	Haynes house	49	02	00	119	43	00	1,130
53	Similkameen—lower ford	49	12	05		53	10	1,244
54	Highest Ashtnolon Mountain	48	58	40	120	01	30	*b* 7,500
55	Ashtnolon Station	48	59	54		02	44	5,558
56	Upper Ashtnolon Ford	49	08	00		08	15	2,431
57	Ashtnolon Cache	49	07	20		19	20	3,556
58	Ptarmigan Hill	49	08	40		26	00	6,331
59	Mouth of Pasayten River	49	09	55		35	55	3,060
60	Roche River Station	48	59	50		41	20	4,300
61	Mouth of Roche River	49	08	30		44	40	3,774 3,459
62	Camp about 600 feet below summit on east side of Hozomeen {outward returning	49	02	05		59	30	5,538 5,527
63	Summit of Hozomeen Pass	49	02	40	121	00	45	6,277
64	Skagit Ford	49	08	00		11	05	1,640 1,634
65	Chuchchehum Pass		00	20		17	40	4,719
66	Chiloweyuck Lake		01	30		25	10	2,052

a Assumed. *b* Approximate.

Elevations along the forty-ninth parallel from the Pacific Ocean to the Rocky Mountains, determined barometrically in the years 1857-1860 by the United States Northwestern Boundary Commission.

No.	Station.	Latitude.		Longitude.		Elevation.
		°	′	°	′	*Feet.*
1	Camp Simiahmoo	49	00.7	122	45.5	11
2	Camp Sumass		01.4		11.9	14
3	Sumass Creek, mouth of; by the creek and lake about 15 miles below Camp Sumass, about 57 miles from the sea; ordinary tides rise here about 1 foot		08.7		04.8	7
4	Mountains east of Pekosie Lake	48	58.5		01.0	4,991
5	Harrison Lake	49	19.1	121	43.4	30
6	Harrison or Shook-o-meh River, mouth of					20
7	Chiloweyuck River, near Hudson Bay Company fishery					15
8	Hach-tcha village, about 77 miles above mouth of Fraser River					29
9	Skow-aal-hu village, about 90 miles above mouth of Fraser River					70
10	Fort Hope, altitude of Fraser River					120
11	Indian village on Chiloweyuck River, 5 miles above Chiloweyuck Depot	49	07.8	121	55.0	77
12	Foot of first high ridge after leaving Chiloweyuck Depot		06.9		56.2	179
13	Chiloweyuck River, north bank, 14 miles above Chiloweyuck Depot, in flat below mouth of Tummeahai Creek, at foot of first mountain over which trail passes		05.0		51.9	419
14	Chiloweyuck River; Frenchmans Camp, 21 miles above Chiloweyuck Depot		05.1		42.8	723
15	Chiloweyuck River; mouth of Utzetza (second large tributary from the north), 26 miles above Chiloweyuck Depot		06.6		36.8	1,071
16	Chiloweyuck River; Samana village, 24 miles above Chiloweyuck Depot and 2 miles above mouth of Senehsay Creek		05.8		39.3	913
17	Chiloweyuck River; 33 miles above Chiloweyuck Depot and 3 miles below Chiloweyuck Lake		06.0		30.7	1,550
18	Chiloweyuck River, 10 miles above Chiloweyuck Depot		06.0		57.8	157
19	Trail, Chiloweyuck Depot to Chiloweyuck Lake; spring west of summit of first high ridge		05.7		54.4	1,027
20	Trail, Chiloweyuck Depot to Chiloweyuck Lake, summit first ridge		05.5		54.2	1,268
21	Tummeahai Creek, mouth of (25 feet above water), 15 miles above Chiloweyuck Depot		04.4		49.3	400
22	Chiloweyuck Depot (15 feet above mean water), 63 miles from the sea		09.5		58.0	39
23	Camp Tummeahai, 3 miles above mouth of Tummeahai Creek		02.1		47.6	1,146
24	Forks of Tummeahai, 7 miles above mouth of Tummeahai Creek		00.2		43.8	2,056
25	Put-lush-go-hap Lake, on Main Fork Tummeahai Creek, 10 miles above its mouth	48	58.5		41.0	3,639
26	Foot of rapids in Tummeahai Creek, below lake, 9¼ miles from creek's mouth		59.2		41.3	2,915
27	Divide between Tummeahai Creek (Main Fork) and Sen-eh-say and Nooksahk, 12 miles above mouth of Tummeahai Creek, 11 miles from mouth of Sen-eh-say Creek, and 5 miles from Nuquoichum, tributary of the Nooksahk		57.4		39.4	6,117
28	Tummeahai Creek (head of South Fork), 11 miles above mouth of Tummeahai Creek		57.8		44.9	3,745
29	Divide between Nooksahk and Tummeahai (South Fork), 11¼ miles above mouth of Tummeahai Creek and 14 miles above Cowap, tributary of the Nooksahk		57.4		44.8	5,893

Elevations along the forty-ninth parallel, etc.—Continued.

No.	Station.	Latitude.		Longitude.		Elevation.
		°	′	°	′	*Feet.*
30	La-yome-sin Creek, crossing about ¼ mile above mouth, 11 miles above Chiloweyuck Depot	49	04.8	121	54.0	572
31	La-yome-sin Creek, 4 miles above mouth		02.8		52.9	1,026
32	Summit, east head of La-yome-sin and Nooksahk, 8 miles above mouth of La-yome-sin		00.0		49.4	5,212
33	Summit of mountain in divide between La-yome-sin and Tummeahai, near junction of this ridge with the Chiloweyuck-Nooksahk divide		00.4		49.6	4,930
34	Chiloweyuck-Nooksahk divide, highest point in this immediate vicinity	48	59.2		53.0	5,200
35	Summit Kaisootst Mountain		57.8		57.0	5,289
36	Summit Signal peak		59.2	122	00.1	4,991
37	Summit Tummeahai	49	01.9	121	45.1	6,633
38	Divide between Nooksahk and Tummeahai	48	57.3		43.5	5,898
39	Summit La-yome-sin Mountain	49	01.9		50.5	5,884
40	Summit Klehtlakeh Mountain		11.0		40.0	6,840
41	Near summit Put-lush-go-hap Mountain	48	59.7		38.8	*a* 7,195
42	Summit Put-lush-go-hap Mountain		59.7		38.8	7,687
43	Sen-eh-say Creek, mouth of, 22 miles above Chiloweyuck Depot	49	04.0		40.8	823
44	Sen-eh-say Creek, 5 miles from mouth, at mouth of Chuchum Creek		02.0		38.0	1,621
45	Sen-eh-say Creek, 8 miles from mouth, at forks	48	59.8		36.7	2,394
46	Sen-eh-say Creek, 11 miles from mouth, at head of West Fork		57.7		39.4	3,302
47	En-saaw-kwatch Creek, mouth of, 29 miles above Chiloweyuck Depot	49	05.5		34.7	1,296
48	En-saaw-kwatch Creek, 4 miles above its mouth		02.2		32.7	2,900
49	En-saaw-kwatch Creek, heads of, 10 miles above its mouth	48	58.5		29.4	5,073
50	Divide between two western tributaries of Klab-neh Creek, 4½ miles from mouth of tributaries		57.4		28.3	5,617
51	High point on same divide; En-saaw-kwatch and Klab-neh		57.0		28.4	6,856
52	First western tributary of Klab-neh Creek, 4 miles above its mouth		58.2		27.3	4,317
53	First western tributary of Klab-neh Creek, mouth of, 2 miles above mouth of Klab-neh and 42½ miles above Chiloweyuck Depot		59.6		23.5	2,076
54	Camp Chiloweyuck on Klab-neh Creek, 1 mile above Lake Depot	49	00.4		23.7	2,002
55	Lake Depot on Chiloweyuck Lake (6 feet above lake level, approximately)		01.8		23.0	1,997
56	Peak west of Chiloweyuck Lake		02.2		26.6	7,244
57	Pekosie Lake, 4 miles above mouth of Pekosie Creek	48	58.9	122	02.8	790
58	Nooksahk River, 46 miles above mouth, and 4 miles above mouth of Pekosie Creek		55.6		02.5	635
59	Nooksahk River, 50 miles above mouth, at mouth of Cowap Creek		53.7	121	57.0	701
60	Nooksahk River, 53 miles above mouth, near mouth of Noochsakatsu, South Branch		53.3		55.1	*b* 936
61	Nooksahk River, 56 miles above mouth, near mouth of Tchahko, South Branch		53.2		52.0	1,299
62	Nooksahk River, 62 miles above mouth, right bank.		53.9		44.7	1,307
63	Nooksahk River, 66 miles above mouth, right bank, at mouth of Nuquoichum		54.1		40.3	2,044
64	Head of Nuquoichum, 4½ miles from mouth		57.8		38.0	5,451

[a] "Summit perhaps 300 feet higher." H. Custer, 1863.

[b] Observations taken on the trail and "should not perhaps be taken as the height of the river."

Elevations along the forty-ninth parallel, etc.—Continued.

No.	Station.	Latitude.		Longitude.		Elevation.
		°	′	°	′	*Feet.*
65	Limit of growth of timber, Put-lush-go-hap Mountain	49	00.0	121	39.0	6,593
66	.....do	48	57.5		37.5	6,117
67	Kockolum Creek, half mile above mouth (mouth is half mile below Chiloweyuck)	49	05.7		26.2	1,978
68	Kockolum Creek, 3 miles above mouth, outlet of first lake (Kehkawalum)		07.2		25.6	2,652
69	Kockolum Creek, 4½ miles above mouth, between two lakes		08.8		24.8	2,843
70	Kockolum Creek, 5½ miles above mouth, divide from Klehkwunnum; near head of Indian Lake and 4 miles from mouth of this tributary of Klehkwunnum		09.5		24.3	3,259
71	Water of second lake, 16 miles from mouth of Klehkwunnum *a*		09.6		24.4	3,132
72	Klehkwunnum Creek, mouth of Pips Creek		12.3		21.4	1,917
73	Klehkwunnum Creek, 19 miles from mouth, marsh lakes near head of		10.0		18.0	1,927
74	Divide between Skagit and Fraser rivers, head of Kle-sil-kwu Creek *b*		09.3		16.8	1,948
75	Junction of Man-sel-pan-ik and Kle-sil-kwu creeks.		07.8		13.6	1,820
76	Junction of Man-sel-pan-ik and Kle-sil-kwu creeks, 4½ miles above mouth of Kle-sil-kwu		08.0		13.0	1,860
77	High mountain, northeast side of Klehkwunnum.		10.6		14.5	6,480
78	Skagit Ford, 110 miles from mouth of Skagit River.		07.7		08.5	1,752
79	Man-sel-pan-ik Creek, 4 miles from junction with Kle-sil-kwu Creek		04.6		14.5	3,027
80	Man-sel-pan-ik Creek, 7 miles from junction with Kle-sil-kwu Creek		02.4		14.3	3,491
81	Man-sel-pan-ik Creek, 7½ miles from junction with Kle-sil-kwu Creek, first western tributary		01.6		14.4	3,550
82	Man-sel-pan-ik Creek, 8 miles from junction with Kle-sil-kwu Creek, where Whatcom trail strikes it		01.2		14.4	4,080
83	Man-sel-pan-ik and Skagit divide, second summit on Whatcom trail		01.9		13.4	5,718
84	Summit on trail, Chuch-che-hum to Skagit, 9 miles from mouth of Man-sel-pan-ik; 7 miles from mouth of Chuch-che-hum		00.6		15.3	4,505
85	Lowest point of same divide		00.5		15.3	4,445
86	Head of gorge 150 yards west of divide		00.4		15.1	4,148
87	Summit of old Whatcom trail		00.9		16.3	5,664
88	Blue Lake, 6 miles from mouth of Chuch-che-hum Creek		00.4		15.6	3,725
89	Divide, Chiloweyuck-Skagit-Fraser		02.3		16.3	6,837
90	Camp Chuch-che-hum, 5½ miles from mouth of Chuch-che-hum Creek		00.1		16.7	3,420
91	Nef Prairie, 3 miles southeast of Lake Depot		00.2		20.2	2,592
92	Klab-neh Creek, 4 miles from mouth	48	58.0		22.6	2,078
93	Klab-neh Creek, 5 miles from mouth, first tributary from the east		57.2		23.1	2,090
94	Klab-neh Creek, 7 miles from mouth, near second large tributary from the east		55.8		23.3	2,243
95	Klab-neh Creek, 9½ miles from mouth, near third large tributary from the east		54.3		25.2	2,414
96	Klab-neh Creek, 10 miles from mouth		54.0		25.6	2,538
97	Near summit of ridge west of Klab-neh		54.0		26.9	4,410

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a This is supposed to be the lowest of all the divides between these two streams, 20 miles from mouth of Klehkwunnum Creek and 7 miles from mouth of Kle-sil-kwu Creek.

b This stream is supposed to fall gently till near its entrance into Fraser River, 2 miles below Fort Hope, where it becomes rapid.

Elevations along the forty-ninth parallel, etc.—Continued.

No.	Station.	Latitude.		Longitude.		Elevation.
		°	′	°	′	*Feet.*
98	Summit of Goat Mountain; divide between Klab-neh and Zakeno (tributary of the Skagit), 30 miles above mouth of Zakeno, 50 miles above mouth of Skagit, and 16 miles from mouth of Klab-neh	48	51.7	121	24.0	5,862
99	On divide Klaheh Creek, a branch of Red Mountain Creek, 4 miles above mouth of latter		52.0		24.2	5,106
100	Red Mountain Creek		52.6		23.1	2,932
101	Red Mountain Creek, 4½ miles above mouth, near head of southern branch		50.9		21.4	3,754
102	Divide Klab-neh and Glacier creeks, 8½ miles above mouth of Red Mountain Creek, 15 miles above mouth of Glacier Creek		52.0		17.6	5,107
103	Glacier Creek (Sko-mel-pua-nook), head or first forks of, 13½ miles above its mouth		52.0		15.4	2,891
104	Glacier Creek, 11 miles above its mouth		52.9		13.4	2,550
105	Glacier Creek, 9 miles above its mouth		53.3		11.2	2,292
106	Glacier Creek, 5 miles above its mouth		54.4		06.0	2,075
107	Glacier Creek, 2½ miles above its mouth		54.4		04.7	1,940
108	Glacier Creek, mouth of, junction with Skagit, 84 miles from mouth of Skagit		55.0		02.4	1,525
109	Skagit River, 87 miles above its mouth		57.2		03.4	1,531
110	Skagit River, 82 miles above its mouth		53.5		01.2	1,468
111	Skagit River, 71 miles above its mouth		48.6		01.6	1,405
112	Skagit River, 64 miles above its mouth		44.2		02.0	1,298
113	Camp Skagit, 96 miles above mouth of Skagit (15 feet above river)	49	00.0		02.8	1,573
114	Skagit Cache, in Skagit Valley, 2 miles east of river		02.2		01.2	1,748
115	Camp on tributary of Skagit, ½ mile above mouth; its mouth 97 miles above Skagit's mouth		01.5		02.0	1,586
116	Camp on tributary of Skagit (Ne-pó-pe-ch-kum), 1 mile above mouth; its mouth 99 miles above Skagit's mouth		02.6		03.1	1,611
117	Camp on Skagit (15 feet above water), 100 miles above Skagit's mouth		02.9		04.0	1,624
118	Camp on Skagit (25 feet above water), 101 miles above Skagit's mouth		03.6		04.3	1,637
119	Camp on slough of Skagit, 104 miles above Skagit's mouth		04.7		05.0	1,675
120	Camp on Skagit (20 feet above water), 108 miles above Skagit's mouth		06.7		07.2	1,727
121	Skagit River, 115 miles above its mouth		11.0		02.6	1,812
122	Skagit River, 120 miles above its mouth, above mouth of Kullas Creek		14.1		03.0	1,947
123	High point on divide, Skagit-Similkameen		18.3	120	56.8	6,871
124	Camp near Skagit-Similkameen divide, 126 miles from mouth of the Skagit		17.8		58.1	5,254
125	Near head of large tributary to the Skagit, 9 miles from its entrance into the Skagit, at which point the elevation is about 1,980 feet, the point being 122 miles above its mouth		16.3		52.1	2,969
126	Summit of pass between Skagit and Similkameen, 126 miles from mouth of Skagit		17.9		59.0	5,668
127	Lake, head of Similkameen, 125 miles from mouth of Similkameen		18.3		57.5	5,307
128	Camp, first forks, *a* 122 miles from mouth of Similkameen		21.6		53.7	4,163
129	On divide, crossing a great bend of the Similkameen		23.2		52.0	5,074
130	Fort Hope trail, 1 mile east of junction with Whatcom, near two small lakes		25.3		52.5	5,947
131	High point on trail		25.0		51.9	5,490

a Whatcom trail leaves river.

Elevations along the forty-ninth parallel, etc.—Continued.

No.	Station.	Latitude.		Longitude.		Elevation.
		°	′	°	′	*Feet.*
132	Forks—trails to Whatcom and to Fort Hope	49	25.8	120	51.1	5,722
133	Fort Hope trail, upper crossing of Similkameen, 120 miles above its mouth		23.8		54.5	4,028
134	Fort Hope trail, 6 miles west of Similkameen crossing and 6 miles from mouth of creek up which the trail runs		21.2	121	00.8	4,436
135	Summit of ridge, left bank of Similkameen, near upper crossing		23.7	120	55.3	4,750
136	Fort Hope trail, summit between two crossings of Similkameen		25.3		52.4	5,965
137	Camp on Fort Hope trail		29.4		47.5	4,906
138	On ridge south of valley of Similkameen		30.4		47.1	4,559
139	Encampement des Femmes, junction of trails to Forts Hope and Kamloops, 104 miles above mouth of Similkameen		31.5		45.2	2,506
140	Summit of ridge north of Encampement des Femmes		34.5		42.8	4,921
141	Summit of ridge on trail		27.2		35.5	4,085
142	Camp on creek 1 mile east of last summit, 1¼ miles above mouth of creek, which is 90 miles above mouth of Similkameen		27.3		34.4	4,035
143	Camp on Similkameen 82 miles above its mouth and one-half mile below mouth of Pa-say-ten Creek		27.0		23.9	2,069
144	Summit of ridge on south side of Similkameen		21.6		24.5	4,041
145	Base of same ridge, crossing of Yakl-keh-whel-lich-ler (?), 11 miles above its mouth, which is 72 miles above mouth of Similkameen		21.5		23.9	2,580
146	Yan-eet-ah-akwa Creek, 5 miles above its mouth, which is 81 miles above mouth of Similkameen.		31.2		24.9	2,379
147	Camp on Similkameen 64 miles above its mouth and 6 miles below Skai-shin Creek		21.3		05.2	1,919
148	Camp on Similkameen 52 miles above its mouth and 3 miles above mouth of Nais-nu-loh		14.5	119	59.9	1,477
149	Similkameen River, 49 miles above its mouth and just below mouth of Nais-nu-loh		13.1		56.8	1,455
150	Camp on Similkameen 36 miles above its mouth, in brushy bottom		09.5		43.8	1,406
151	Camp on northeast tributary of Similkameen 2 miles above mouth, the mouth 38 miles above mouth of Similkameen		11.7		42.5	2,248
152	Camp in flat near river, one-half mile above mouth of large creek coming from west, its mouth 31 miles above mouth of Similkameen		05.2		43.0	1,356
153	Camp on side of mountains, one-half mile north of creek coming from southwest, its mouth 26 miles from mouth of Similkameen		01.8		41.1	1,652
154	Summit of ridge bordering Similkameen River on west side		03.0		43.0	5,068
155	Camp Similkameen, 12 miles above mouth of Similkameen	48	59.2		34.9	1,164
156	Camp on Similkameen 1¼ miles above mouth of Similkameen		55.5		25.0	904
157	Camp on Okinakane 11 miles below forks, 61 miles above mouth of Okinakane; 567 miles above mouth of Columbia		46.0		22.6	955
158	Lake Osoyoos, foot of (4 feet above water), 76 miles above mouth of Okinakane		57.0		24.2	957
159	Lake Osoyoos, camp on east side, 82 miles above mouth of Okinakane	49	02.4		25.0	953
160	Lake Osoyoos, north end of (inlet), 86 miles above mouth of Okinakane		04.5		29.2	931
161	Height of second plateau at foot of hills		13.1		32.3	1,633
162	.....do		06.9		28.9	1,430

Elevations along the forty-ninth parallel, etc.—Continued.

No.	Station.	Latitude.		Longitude.		Elevation.
		°	′	°	′	*Feet.*
163	Summit of ridge, 3 miles east of Okin-á-kane River.	49	07.3	119	27.8	3,027
164	Summit of trail, Similkameen to Okinakane......		11.4		39.0	4,251
165	Lake Haipwil (2¼ miles long by three-fourths mile wide)..	48	51.0		37.0	1,120
166	Summit of mountain, north of lake................		55.6		36.8	4,565
167	Camp on Haipwil Creek 3 miles above forks and 12 miles above its mouth..........................		47.0		37.9	1,376
168	Camp on Haipwil Creek one-half mile above forks and 9 miles above its mouth......................		48.9		38.0	1,366
169	On Haipwil where it enters couleé, 20 miles above its mouth..		40.8		39.1	1,643
170	Divide between Haipwil and Okinakane, near two lakes		48.5		35.4	1,701
171	Summit of hill, Okinakane Valley..................		45.1		23.6	2,487
172	Camp on Haipwil (West Fork) 8 miles above forks and 17 miles above mouth of Haipwil............		47.5		48.7	4,599
173	Summit of trail between a tributary of Che-wach (branch of Haipwil) and [Lake?] Methow, 20 miles from mouth of Haipwil and 5 miles from mouth of Che-wach		46.2		52.0	6,854
174	West foot of ascent to summit.......................		45.9		52.6	6,220
175	On Che-wach at forks, 67 miles above mouth of Methow and 559 miles above mouth of Columbia.		47.8		57.5	3,296
176	Near mouth of tributary of west fork of Haipwil, 9 miles from forks of Haipwil...................		47.9		49.7	4,627
177	Large lake southwest of mouth of Similkameen, south end, 8 miles from Okinakane River.......		50.9		29.0	1,819
178	Smaller lake southwest of mouth of Similkameen, east side, 2 miles from Okinakane River.........		53.0		27.5	1,766
179	Summit of trail, Skagit to Pasayten.................	49	02.3	120	57.4	5,900
180	Saddle Divide, waters Skagit and Pasayten, 10 miles from mouth of Ne-po-pe-eh-kum Creek, which is 100 miles above mouth of Skagit and 24 miles from mouth of N'-shitl-shutl River.........		02.1		57.1	5,281
181	Summit Cache..		01.9		56.5	5,594
182	First depression east of Summit Cache............		02.0		55.3	5,570
183	Third high point east of Summit Cache............		02.8		53.7	5,819
184	Summit to north of trail [a]...........................		02.5		54.6	6,221
185	Summit near end of ridge..........................		03.0		50.0	6,233
186	First water below ridge on trail, 15 miles above mouth of N'-shitl-shutl, which is at Pasayten Cache		03.2		48.6	3,860
187	Camp on N'-shitl-shutl 10¼ miles above its mouth, at mouth of Chu-chu-wun-ten....................		03.5		42.9	3,431
188	Pasayten Cache, at mouth of N'-shitl-shutl, 24 miles above mouth of Pasayten, which is 82 miles above mouth of Similkameen....................		09.6		33.6	3,194
189	Camp Pasayten, 36 miles from mouth of Pasayten.	48	59.7		32.2	3,676
190	First knoll on mountain east of Pasayten Cache...	49	08.7		32.0	4,880
191	Top of rocky slide near which trail passes on same mountain		07.5		29.5	6,456
192	Camp on west slope of mountain...................		06.7		31.3	4,777
193	Elevation east of hill		06.6		30.8	5,157
194	Camp..		07.5		28.3	4,701
195	Western principal summit..........................		07.5		25.5	6,433
196	Eastern principal summit		07.8		23.5	6,455
197	Camp east and above tributary of Nais-nu-loh.....		08.2		22.2	6,494
198	Elevation 1¼ miles east of above....................		08.3		21.6	6,170

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[a] To the north of this trail, in latitude 49° 03.7′, longitude 120° 53.5′, is another divide, between Ne-po-pe-eh-kum and N'-shitl-shutl, which is about 4,500 feet high. It is 11 miles from mouth of N'-shitl-shutl.

Elevations along the forty-ninth parallel, etc.—Continued.

No.	Station.	Latitude.		Longitude.		Elevation.
		°	′	°	′	*Feet.*
199	Camp on Nais-nu-loh, 18 miles above its mouth....	49	08.8	120	15.1	3,568
200	Camp Nais-nu-loh Cache, 21 miles above mouth of Nais-nu-loh....		07.2		17.3	3,678
201	Saddle between two principal summits, 26 miles above mouth of Nais-nu-loh....		07.5		24.2	6,005
202	Camp on Nais-nu-loh, 7 miles above its mouth, at bend, mouth of creek....		07.8		00.5	2,525
203	Camp on Nais-nu-loh, 5¼ miles above its mouth, at trail crossing....		09.1		00.2	2,171
204	On Nais-nu-loh, ¼ mile above its mouth, where trail leaves it....		13.1	119	57.4	1,515
205	Camp on southeastern tributary of Lake Osoyoos, 6 miles from its mouth, last trail crossing....	48	59.5		16.4	3,092
206	Summit of trail, Lake Osoyoos to Ne-hoi-al-pit-kwu River....	49	00.6		11.8	4,068
207	Highest terrace east of summit....		01.1		09.3	3,476
208	Fourth terrace east of summit, just before descending to valley of Rock Creek....		02.6		05.4	3,032
209	First crossing of Rock Creek, 6 miles above its mouth....		02.7		05.2	2,762
210	Fourth terrace, just after ascending from valley of Rock Creek....		02.8		04.9	3,101
211	Upper terrace above town [? Twai-yeep] on Rock Creek, just before descending to Ne-hoi-al-pit-kwu River....		03.2	118	59.0	2,366
212	Upper camp on Ne-hoi-al-pit-kwu, 80 miles above its mouth, at mouth of Rock Creek....		03.2		58.7	2,158
213	Camp Ne-hoi-al-pit-kwu, 66 miles above its mouth (20 feet above water)....	48	59.1		44.5	1,826
214	On Ne-hoi-al-pit-kwu River, 44 miles above its mouth....	49	00.4		23.4	1,663
215	Camp Statapoostin, 36 miles above its mouth....		00.2		16.8	1,686
216	En-cháhm Lake, outlet of, 1¼ miles from Ne-hoi-al-pit-kwu River, at a point 32 miles from its mouth.		02.1		12.7	1,531
217	Camp on Ne-hoi-al-pit-kwu, 29 miles from its mouth....	48	59.4		12.5	1,468
218	Camp on Ne-hoi-al-pit-kwu, 16 miles from its mouth....		50.5		10.4	1,466
219	Camp on Ne-hoi-al-pit-kwu, 9 miles from its mouth.		46.3		06.8	1,226
220	Camp on Ne-hoi-al-pit-kwu, 1 mile from its mouth.		40.9		06.5	1,271
221	Camp on Ne-hoi-al-pit-kwu, at mouth, 746 miles from mouth of Columbia....		40.0		06.2	1,252
222	Columbia River crossing, 1 mile below Kettle Falls (20 or 25 feet high), 782 *a* miles above its mouth..		36.8		07.5	1,202
223	Columbia River camp (25 feet above river), 766 miles above its mouth....		51.6	117	53.9	1,341
224	Camp Columbia (53 feet above water now nearly at lowest stage), 783 miles above its mouth....		59.8		37.7	1,317
225	Camp Columbia (another measure)....					1,514
226	Camp on summit on trail westward from Camp Columbia....		58.6		45.4	3,410
227	Camp on tributary of Yóme-tsin, 4 miles from Yóme-tsin's mouth, which is 775 miles from mouth of Columbia....		58.1		48.1	2,166
228	High point on trail....		58.9		49.5	4,650
229	Camp....		58.0		58.7	2,684
230	Summit on trail, divide between Yome-tsin and Ne-hoi-al-pit-kwu....		57.7	118	02.9	4,739
231	Camp on tributary of Ne-hoi-al-pit-kwu, 5 miles above its mouth, which is 28 miles above mouth of Ne-hoi-al-pit-kwu....		57.2		07.0	3,868

a Apparently an error for 742.

Elevations along the forty-ninth parallel, etc.—Continued.

No.	Station.	Latitude.		Longitude.		Elevation.
		°	′	°	′	*Feet.*
232	High point on trail east of divide	48	57.8	118	02.0	4,707
233	Crossing Creek, 3 miles east of camp—first plateau, 2 miles above mouth of creek, which is 59 miles above mouth of Okinakane		43.7	119	19.2	1,383
234	Crossing Creek, 5 miles east of camp—second plateau, 6 miles above mouth of Kwahaloose Creek, which is 57 miles above mouth of Okinakane River		42.1		15.2	2,158
235	Divide between Kwahaloose Creek and large eastern tributary [Lower Bonaparte of Arrowsmith's map] of Okinakane River		40.6		13.7	3,350
236	Camp on first large branch of Lower Bonaparte River, 3 miles above mouth of branch and 12 miles above mouth of river		39.6		08.2	2,563
237	Divide between 2 branches of Lower Bonaparte River and a southern tributary of the Ne-hoi-al-pit-kwu River; 11 miles above mouth of first branch, which is 12 miles above mouth of second branch, which is 33 miles above mouth of Lower Bonaparte River and 22 miles from mouth of southern tributary of Ne-hoi-al-pit-kwu River, which is 63 miles above mouth of that river		41.3	118	58.3	4,312
238	Camp on second branch of Lower Bonaparte River, 9 miles above its mouth		40.7		54.7	3,531
239	Camp on second branch of Lower Bonaparte River, 3 miles above its mouth		38.7		47.8	2,459
240	Summit of ridge north of No. 238=average height of mountains in vicinity		41.0		56.6	5,220
241	Crossing of Lower Bonaparte, 38 miles above its mouth		38.7		39.9	2,746
242	Divide between Okinakane and Columbia, 45 miles from mouth of Lower Bonaparte and 19 miles from the Columbia, at a point 739 miles from its mouth		37.9		32.3	5,662
243	High point north of trail on divide between Okinakane and Columbia		39.2		33.1	7,035
244	Camp No. 3, on Columbia River [a]	48	37.0	118	06.9	1,207
245	Camp No. 2, on Columbia River					1,622
246	Summit of ridge bordering Colville Valley to north					3,017
247	Camp No. 1, on Peptashin Creek near mouth					1,535
248	Summit of ridge=average height of ridges in vicinity					3,718
249	Camp No. 15, Peptashin Creek near town					1,957
250	Colville depot, at observatory					1,963
251	Camp No. 1, Mill Creek near Colville depot					1,653
252	Lake 5 miles southeast of Colville depot					2,153
253	Summit of mountain west of Colville depot					3,330
254	Summit of mountain 6 miles east of Colville depot					5,697
255	Camp No. 2 on Mill Creek near Stugar's farm					1,629
256	Mountain east of Camp No. 2					4,880
257	Mountain south, on same ridge, and north of Francois' house					4,096
258	Camp No. 3, near Francois' farm					1,717
259	Mountain southwest of Francois', near trail					3,186
260	On branch of Mill Creek, at crossing of trail, 5 miles south of Francois', An-i-aht-wa or Oit-chin Prairie					1,765
261	Crossing of first stream south of Hughes ranch on wagon road					1,734
262	On wagon road between Colville and Spokane at small ponds					2,119
263	On head of small lake, east end, near wagon road					1,970

[a] Second cahier begins here.

Elevations along the forty-ninth parallel, etc.—Continued.

No.	Station.	Latitude.	Longitude.	Elevation.
		° ′	° ′	*Feet.*
264	Highest point on Colville wagon road	....	....	4,033
265	Chemakane bridge, junction of trail and wagon road	....	....	1,922
266	Summit of trail between Mill Creek and Little Spokane	....	....	2,735
267	Walker's Prairie, on small branch of Chemakane	....	....	1,897
268	Mouth of Chemakane—approximate	....	....	1,366
269	Summit of trail, short cut between Chemakane and Spokane	....	....	2,809
270	Trail at northernmost bend of Spokane River, 13 miles below mouth of Little Spokane *a*	....	....	1,500
271	On plateau above Spokane River, 7 miles below mouth of Little Spokane	....	....	1,854
272	On edge of Spokane River, 7 miles below mouth of Little Spokane	....	....	1,553
273	Little Spokane, mouth of, at water's edge	....	....	1,635
274	Summit of hill, northeast of mouth of Little Spokane	....	....	3,140
275	On little Spokane, near crossing of trail	....	....	1,609
276	On plateau south of crossing	....	....	1,760
277	On plateau of Spokane River	....	....	1,878
278	Hill in bend of Little Spokane, about 5 miles from mouth	....	....	2,355
279	On edge of plateau south of trail	....	....	2,266
280	On Spokane River, water's edge, near Plant's	....	....	1,901
281	On plateau north of Plant's	....	....	2,375
282	Plant's house	....	....	2,08
283	Trail to Sinyakwateen, 11 miles from Plant's	....	....	2,228
284	Trail on Spokane, 8¼ miles below lake [Cœur d' Alene]	....	....	2,135
285	Cœur d'Alene Lake	....	....	2,151
286	Hill near lake, south of trail	....	....	2,499
287	On small lake north of Cœur d'Alene Lake	....	....	2,205
288	On summit of spur bordering lake	....	....	2,862
289	Average height of rolling country north and northeast of lake	....	....	3,170
290	Plateau north and east of trail to Mission	....	....	2,767
291	Creek 3¼ miles east of arm of lake [Cœur d'Alene]	....	....	2,121
292	Plateau north of creek crossing	....	....	2,681
293	Shore of large lake south of Checolsum Mountain	....	....	2,262
294	Point on mountain spur between lakes	....	....	3,577
295	Trail to Sinyakwateen, 19 miles from Plant's	....	....	2,200
296	Little knoll 5 miles beyond and west of road	....	....	2,835
297	Tesemmeus lakes, [? Tesimini]	....	....	2,322
298	On edge of plateau 3 miles east of road	....	....	2,540
299	Top of plateau on road 4 miles south of Pekowla Lake	....	....	2,539
300	Bottom of plateau	....	....	2,333
301	On Pekowla Lake	....	....	2,200
302	Sinyakwateen depot, right bank of Clark Fork of the Columbia River	....	....	2,084
303	Vermilion Creek, mouth of fall of Clark Fork from [Pend Oreille] lake to falls about 0.44 foot per mile; falls about 5 feet	....	....	2,074
304	Checolsum Mountain	....	....	5,706
305	Crossing of trail near forks of creek north of Checolsum Mountain	....	....	2,455

a From the northernmost bend to mouth of Spokane the average fall is about 9 feet per mile.

Elevations along the forty-ninth parallel, etc.—Continued.

No.	Station.	Latitude.	Longitude.	Elevation.
		° ′	° ′	*Feet.*
306	Crossing of tributary of Little Spokane. Little Spokane has an average fall of about 15 feet per mile			1,880
307	Lake on Little Spokane			1,947
308	Trail north of lake			2,093
309	On plateau above Little Spokane			? 2,441
310	On high plateau on trail			2,358
311	Lake at head of Little Spokane			2,237
312	Trail between Spokane and Clark Fork Divide			2,835
313	Clark Fork at outlet of Pend Oreille Bay			1,942
314	Clark Fork 8 miles below falls			2,024
315	Clark Fork 4 miles above Mission			1,937
316	Clark Fork at mouth of Skomin Creek			1,926
317	St. Ignatius Mission			1,894
318	Skomin Creek, 5 miles above mouth			2,769
319	Skomin Creek, 9 miles above mouth			2,901
320	Skomin Creek, 11 miles above mouth			3,736
321	Divide between Skomin and Chelonscan creeks			4,199
322	Mountain 1¼ miles south of divide			5,218
323	2 miles below divide on eastern slope			3,438
324	Trail from Mission to Kaniksu Lake, 7 miles			3,041
325	Crossing of creek, 12 miles from Mission			3,535
326	Trail above and beyond crossing of creek			3,640
327	Teh-kwat Mountain, north of trail			5,770
328	Water on Teh-kwat Mountain, south of trail			5,443
329	Crossing of first creek east of divide			2,740
330	Creek 5 miles west of lake			2,606
331	Kaniksu Lake			*a*2,443
332	Upper Kaniksu Lake			*a*2,435
333	On creek, 2 miles above Upper Lake			2,469
334	Long bridge on trail from Sinyakwateen to Chelemta, 6 miles			2,086
335	Clark Fork, 14 miles above Sinyakwateen			2,089
336	Kalispelm Lake			2,095
337	Pack River crossing			2,101
338	Divide between Pack and Kootenay rivers			2,138
339	Small lake west of trail and north of divide			2,090
340	Trail in forks of creek			2,064
341	Chelemta depot			1,796
342	Kootenay River, 18 miles below Chelemta			1,802
343	Crossing of Acklew Creek			2,248
344	Acklew Cache			2,304
345	Camp Kootenay West (about 50 feet above water)			1,823
346	Mountain N. 42° E. from Camp Kootenay West			5,573
347	Trail from Chelemta to Acklew, 8 miles, first water			2,695
348	Trail from Chelemta to Acklew—10¼ miles			2,694
349	Trail from Chelemta to Acklew—14 miles—crossing of stream			2,557
350	Trail from Chelemta to Acklew—17 miles—grassy mound			2,548
351	Trail from Acklew to Mooyie—1 mile—divide on trail			3,260
352	Trail from Acklew to Mooyie—3 miles—divide			2,985

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a The contradiction here by which the upper lake level is less than the lower one is noted in the original MS., but not corrected.

Elevations along the forty-ninth parallel, etc.—Continued.

No.	Station.	Latitude.	Longitude.	Elevation.
		° ′	° ′	*Feet.*
353	Trail from Acklew to Mooyie—3½ miles—head of Ar-ka-klu-ne *a* Creek	....	....	2,882
354	Trail from Acklew to Mooyie—8 miles—prairie	....	....	2,638
355	Trail from Acklew to Mooyie—13 miles—creek crossing	....	....	2,798
356	Trail from Acklew to Mooyie—terrace south of crossing	....	....	2,811
357	Trail from Acklew to Mooyie—lower crossing of Ar-ka-klu-ne	....	....	2,678
358	Trail from Acklew to Mooyie—terrace above	....	....	2,756
359	Trail from Acklew to Mooyie—crossing of Mooyie	....	....	2,682
360	Camp Mooyie	....	....	2,689
361	Mooyie Cache	....	....	2,742
362	Mountain ridge east of Camp Mooyie	....	....	6,639
363	Summit of ridge	....	....	6,698
364	Same ridge 8 miles south	....	....	4,466
365	Crossing of Mooyie 8 miles below Camp Mooyie	....	....	2,142
366	Second crossing of Mooyie, from cache (14 feet above water)	....	....	2,718
367	Fourth crossing of Mooyie, from cache	....	....	2,850
368	Sixth crossing of Mooyie, from cache	....	....	2,934
369	7 miles from sixth and 2½ miles from seventh crossing	....	....	2,940
370	Seventh crossing at foot of lake (3 feet above water)	....	....	3,029
371	Terrace east of seventh crossing—on trail	....	....	3,291
372	First stream—2½ miles beyond seventh crossing of Mooyie	....	....	3,067
373	Second stream—9½ miles beyond seventh crossing of Mooyie	....	....	3,766
374	Third stream—10½ miles beyond seventh crossing of Mooyie	....	....	3,514
375	11 miles from seventh crossing, north of lakes	....	....	3,136
376	Headwaters of Mooyie, 13½ miles from seventh crossing	....	....	3,296
377	Terrace near headwaters of Mooyie	....	....	3,383
378	South and near divide between Mooyie and Kootenay	....	....	3,544
379	Divide between Mooyie and Kootenay	....	....	3,642
380	Joseph's Prairie	....	....	2,959
381	Crossing of stream [Akis-ka-klail] south of Joseph's Prairie	....	....	3,041
382	Kootenay River northeast of Joseph's Prairie	....	....	2,451
383	Crossing of first creek going down the Kootenay *b*	....	....	2,682
384	Crossing of second creek going down the Kootenay—10 miles beyond	....	....	2,679
385	Crossing of third creek going down the Kootenay	....	....	2,619
386	Crossing of fourth creek going down the Kootenay	....	....	2,741
387	Creek 9 miles beyond	....	....	2,420
388	Prairie on Kootenay—25 miles above Camp Kootenay East	....	....	*c* 2,400
389	Prairie on Kootenay—10 miles above Camp Kootenay East	....	....	2,364
390	Kootenay River—6 miles above Camp Kootenay East	....	....	2,361
391	On creek—5½ miles north of Camp Kootenay East	....	....	2,401
392	Camp Kootenay East (30 feet above water)	....	....	2,348

a Also written Acaclunah.

b The fall of Kootenay River for about 30 miles south from latitude 49° 35′ N. is 2 feet per mile.

c At bend of Kootenay River above mouth of Elk River computed height is 2,381 feet. The fall of the Kootenay for about 20 miles from above mouth of Elk River south is 4½ feet per mile.

Elevations along the forty-ninth parallel, etc.—Continued.

No.	Station.	Latitude.	Longitude.	Elevation.
		° ′	° ′	*Feet.*
393	Camp Kootenay East—at water			2,318
394	South of Camp Kootenay East (3 feet above water)			2,313
395	Kootenay River 2½ miles below camp (3 feet above water)			2,300
396	Kootenay Cache			2,316
397	First bench above river			2,368
398	Second bench above river			2,566
399	First creek south of Kootenay Cache			2,356
400	Trail on Tobacco Plains, highest point south of cache			2,755
401	Creek 9 miles from cache			2,691
402	Entrance of Akonoho Pass			3,015
403	11 miles from entrance and 3 miles from summit of pass			4,195
404	2½ miles west of summit			4,460
405	One-half mile west of summit			5,138
406	Divide between Kootenay and Flathead rivers			5,218
407	On divide, one-half mile north of pass			6,953
408	On spur of divide, 2 miles north of pass			6,278
409	Divide between Wigwam and Akonoho			5,332
410	Wigwam Station			4,694
411	Small prairie one-half mile east of summit of pass			5,065
412	Four miles east of summit of pass (65 feet above water)			4,731
413	Crossing of stream, 7½ miles east of summit			4,522
414	Prairie, 12 miles east of summit			4,164
415	Large creek down which trail follows (water of Yakinikak creek opposite Prairie)			4,112
416	Flathead valley, upper terrace			4,267
417	Peak west of Flathead			7,378
418	Crossing of Flathead			3,827
419	1½ miles beyond crossing, in Prairie			3,763
420	Camp Kishenehn, 4 miles to mouth of Kishenehn—fall 53 feet per mile			4,134
421	Three miles above Camp Kishenehn (3 feet above water)—fall 63 feet per mile			4,252
422	Prairie, 8 miles above Kishenehn—fall 58 feet per mile			4,541
423	Angle of valley, 12 miles above—fall 36 feet per mile			4,705
424	Angle of valley, 2½ miles above this angle			4,808
425	Open place in burnt timber			5,183
426	Mule camp			5,191
427	Summit of pass, 9 miles from angle, 21 miles from Camp Kishenehn and 25 from mouth of creek			5,846
428	Near outlet of lake east of summit			5,407
429	1½ miles east of summit, on creek			5,378
430	Camp Akamina			6,447
431	On divide north of summit monument			7,986
432	Bluff SE. of Camp Akamina			6,648
433	Summit monument			[a]7,490
434	Mountain in divide 1½ miles N. of pass			8,087
435	Mountain in divide 1 mile NE. of last			8,207
436	Mountain in divide one-half mile N. of last			8,313
437	Mountain in divide 2½ miles NE. of last			8,833

[a] Another value given in the table, and without comment, is 6,548. Can this be an error for 7,548?

Elevations along the forty-ninth parallel, etc.—Continued.

No.	Station.	Latitude.	Longitude.	Elevation.
		° ′	° ′	*Feet.*
438	Summit of Boundary Pass			6,955
439	Mountain, 1½ miles north of pass			7,861
440	Kishenehn Mountain			[a]8,487
441	Mountain up pass and to the north			[a]7,409
442	Kishnenehna Mountain, north and west peak			[a]7,937
443	Kishnenehna Mountain, center peak			[a]8,170
444	Kishnenehna Mountain, south and east peak			[a]9,137
445	Divide 2 miles east of Camp Kishenehn			5,541
446	In valley of creek west of camp and north of boundary			5,119
447	Boundary Mountain, highest peak			8,574
448	Southwest point of ridge of Boundary Mountain			7,260
449	Kootenay River, 3 miles below parallel			2,308
450	Kootenay River, 17 miles below parallel			2,256
451	Kootenay River, 33½ miles below parallel			2,204
452	Kootenay River, 39 miles below parallel			2,184
453	Kootenay River, 50 miles below parallel at crossing of trail			2,148
454	Kootenay River, 13 miles below crossing (8 feet above water)			2,057
455	Kootenay River, 25 miles below crossing; below falls, at high-water mark			1,967
456	Kootenay River, 39 miles below crossing; mouth of the Yahk			1,934
457	Kootenay River, 44 miles below crossing; terrace above river			2,298
458	Forage cache on trail 13 miles from Yahk			2,161
459	Camp on terrace on trail 3 miles east of Mooyie Crossing			2,260
460	Kootenay River, 55 miles below crossing; mouth of Mooyie			1,792
461	Kootenay River, 61 miles below crossing; Chelemta depot (9½ feet above high water)			1,796
462	Summit of mountain range between waters of Wigwam River and Skits-ooh-nau-na Creek			7,852
463	Camp in forks of tributary of Tobacco River			3,256
464	Camp on west side of Kootenay Valley			2,942
465	Camp on waters of Kootenay, near divide with Yahk			4,862
466	Summit of divide between Yahk and Kootenay			5,498
467	Camp west of divide			5,520
468	.....do			4,954
469	Camp on mountain, tributary of Yahk			4,794
470	Camp on east fork of Yahk			3,483
471	Camp in forks of Yahk			3,194
472	Camp at east bend of Yahk			2,983
473	Camp on Yahk			2,959
474	Camp at west bend of Yahk			2,935
475	Camp on Yahk			2,759
476	.....do			2,697
477	Camp below falls			2,414
478	Camp at mouth of Yahk			1,926

[a] Measured with theodolite.

INDIAN NAMES.

In the prosecution of the survey considerable attention was given to the language of the native tribes along the line. George Gibbs, who accompanied the party, is referred to in various capacities as geologist, ethnologist, guide, interpreter, and naturalist. The first Chinook dictionary is said to have been prepared by him, and this was to form a part of the final report of the survey. Later Mr. Gibbs was engaged by the Smithsonian Institution in elaborating linguistic material from the tribes of the Northwest. This work was unfinished at the time of his death in April, 1873. Some of it has been published since. To secure uniformity in the spelling of the names of various camps and stations Mr. Gibbs prepared lists which were submitted to General Parke and made official. There are three such lists among the papers. The first two are signed; the third is not signed. The first list is as follows:

Adopted spelling of the names of camps, etc.

[Official: John G. Parke, chief astronomer and surveyor.]

Chiloweyuck.
Chuch-che-hum.
En-saaw-kwatch.
Fraser.
La-yome-sin.
Nooksahk.
Okinakane.
Pehosie.
Semiahmoo.
Sen-eh-say.
Similkameen.
Skagit.
Sumass.
Swehl-tcha.
Tummeahai.

The three lists have been combined, arranged, studied in company with the published maps of the boundary and later official maps. The results are here given with notes derived from such comparison and study. For easy reference on the maps the approximate longitudes are given.

	Approximate longitude.	
	°	′
A-kám-i-na;[1] east fork of Kish-e-nehn Creek	114	10
A-kin-ís-sahtl; Flathead River	114	30
A-kin-kwo-náh-ki;[2] branch of Flathead River heading with Tobacco River	114	30
Ak-káph-kleh; falls of the Kootenay River, Flathead County, Montana	115	45
Ak-o-nó-ho; creek tributary to Tobacco River[3]	115	05
Ak-swák; creek from south at bend of the Kootenay[4]	115	15

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[1] Kam-i-na=watershed.

[2] Perhaps this is Yokinikah Creek of the Land Office map of Montana.

[3] Tobacco River=Grave Creek of Land Office map of Montana.

[4] Not named on boundary map; apparently Fisher Creek of Land Office map of Montana, and Masula River of official map of British Columbia, 1895.

	Approximate longitude.	
	°	′
Ak-tlak-a; creek above Kish-e-nehn, tributary to Flathead River. Not named on boundary map	114	25
A-kwote-kátl-nam; Chief Mountain or Waterton Lake, upper part across boundary	114	
An-i-áht-wha; Kamass Prairie		
Che-chéet-hu; Skagit cache	121	05
Chelemta (also written Cholemta); cache or depot. Not shown on map or identified. (See Swoots-kóse and Yah-kwoo-káh-keh)	116	20
Che-loús-kan; Little Pend Oreille	116	40
Chém-a-kane; bridge over Walkers Prairie Creek	116	46.4
Chiloweyuck; camp, lake, river, town, etc. Now written Chilliwhack	121	30
Chow-a-wee-la; Fool's Prairie. Not identified.		
Chuk-kóse; the Mooyie Lakes. Not shown on map. In British Columbia, latitude 49° 18′	115	50
Chuch-che-hum; camp and creek tributary to Chiloweyuck Lake	121	15
Chu-chu-wán-ten; creek tributary to N'shitl-shootl River, which is tributary to Pa-say-ten	120	40
En-cháhm;[1] lakes near Statapoostin	118	13
En-kwool-eh-la; mouth of Clark forkof the Columbia. Name not on boundary map	117	37
En-saaw-kwatch;[2] station and creek tributary to the Chiloweyuck	121	30
Háip-wil;[3] lake near camp Similkameen	119	37
Hó-zo-meen; mountain near camp Skagit	121	
In-chú-in-tum;[4] station and river tributary to the Ne-hoi-al-pít-kwu	118	25
Ka-cha-átl; Indian village Aklew (or Acklew) cache	116	22
Kái-seet-lin; crossing of Spokane. Not identified.		
Kais-in; branch of Kat-láh-woke Creek. Not on map and not identified.		
Kal-is-pelm; Pend Oreille Lake in northern Idaho	116	30
Kam-i-na=a watershed.		
Kat-láh-woke; creek running to Flathead [river] through [Boundary] pass; not named on boundary map and not identified. It is near Kísh-e-nehn Creek	114	20
Ka-yak-ka;[5] creek, from south, tributary to Kootenay below falls; large lake on it	115	50
Kin-nook-kleht-nán-na;[6] creek running east from divide [of Rocky Mountains] to [Chief Mountain or Waterton] lake	113	50

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[1] Christina Lake of official map of British Columbia, 1895.

[2] Written En-saw-kwatch on boundary map and on above map called Nesquatch.

[3] Harpwil of British Columbia map of 1895 and Blue Lake of Land Office map of Washington.

[4] North fork of Kettle River of British Columbia map of 1895. Also Inishwolnton in the manuscript notes.

[5] Lake Creek of Land Office map of Montana.

[6] Kotanie River of official map of British Columbia, 1895.

	Approximate longitude.	
	°	′
Kínt-la; lake and mountains, Flathead County, Montana	114	15
Kísh-e-nehn; camp, creek, and mountain	114	20
Kish-ne-néh-na; mountains	114	15
Kit-lat-laā-nook; creek heading east of Mount Wilson and emptying into lower [Chief Mountain or Waterton] lake	113	50
Kle-síl-kwu;[1] creek tributary to upper Skagit, heading with Klehkwunum	121	15
La-yome-sin;[2] creek, tributary to the Chiloweyuck	121	54
Man-sel-pán-ik;[3] creek, tributary to Kle-sil-kwu Creek, heading with Chuch-che-hum	121	15
Moo-yie;[4] camp, monument, river, and trail	116	15
Náís-nu-loh; station and river, south fork of Similkameen	120	
Ne-hoi-al-pít-kwú;[5] camp and river	118	30
Ne-pó-pe-éh-kum; creek, tributary to the upper Skagit	121	
Nook-sahk; river, Whatcom County, Washington. Now written Nooksak	122	15
N'-shitl-shootl;[6] creek, tributary to Pa-say-ten River	120	40
Okin-á-kane, now written Okanogan; county and river tributary to the Columbia	119	30
O-só-yoos; camp, lake, and station	119	25
Pa-sáy-ten;[7] river tributary to Similkameen	120	30
Pehosie, or Pekosie; lake and creek tributary to the Nooksak	122	05
Pep-táh-shin; creek at [Colville?] depot	118	
Sah-lílt-kwu; the forks [of ?]. Not identified. Name not on boundary map.		
Se-háí-uks; the creek [at Archer's camp of October 10]. Not identified.		
Se-háí-ya-kan; Archer's camp of October 10. Not identified.		
Semiahmoo; bay and camp near western end of parallel	122	45
Sen-eh-say;[8] station and creek, tributary to the Chiloweyuck	121	40
Sháh-wa-tum; mountain on upper Skagit	121	
Shwo-yél-pi; Kettle Falls of the Columbia	118	10
Si-míl-ka-meen; camp and river tributary to the Okanogan	119	30
Sin-páíl-hu;[9] creek running south to the Columbia	?118	10
Skagit; cache, camp, county, and river, Washington	122	

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[1] Klesilkwa of official map of British Columbia, 1895.

[2] Written Layomesin on boundary map. Sweltzer River of official map of British Columbia, 1895.

[3] Maselpanic, of official map of British Columbia, 1895.

[4] The river is now known as Methow.

[5] Kettle River, of official map of British Columbia, 1895.

[6] Roche River, of official map of British Columbia, 1895.

[7] Pasayton, of official map of British Columbia, 1895.

[8] Slesse, of official map of British Columbia, 1895.

[9] Not shown on boundary map. Land Office map of Washington has Sinpailhu, or Milk Creek (long. 118° 10′), just below Kettle Falls; also San Poil River and guide meridian. This latter is Sans Poil of official map of British Columbia, 1895.

	Approximate longitude.	
	°	′
Skits-ooh-nán-na; small creek tributary to the Kootenay; not shown on boundary map	115	05
Skwái-kwi-éht; mountain at head of Chu-chu-wán-ten Creek.	120	40
Stat-a-poós-tin; camp on the Ne-hoi-al-pít-kwu	118	15
Stle-kéhm; Mill Creek [? near old Fort Colville, longitude 117° 40′].		
Sumass, now usually written Sumas; camp, lake, town, etc	122	10
Swehl-tchá;[1] lake in British Columbia	122	
Swoots-kóse; the Chelemta cache [not on boundary map]. See Yah-kwo-káh-keh.		
Tcho-páhk;[2] mountain west of Camp Similkameen	119	45
Te-kum-whéhl-tin; Archer's camp of October 9; not identified	....	
Tummeahai;[3] camp and creek tributary to the Chiloweyuck	121	45
Twáí-yeep; upper forks of Ne-hoi-al-pít-kwu[4]	119	
Wáí-haist; mountain on Upper Skagit; not named on boundary map	121	
Yah-kwoo-káh-keh; the Chelemta cache. See Swoots-kóse. Not identified.		
Yahk;[5] station and river, Flathead County, Montana	115	45
Yak-ín-a-kahk;[6] creek and pass	114	30
Yakl-tó-le-min; mouth of Pa-say-ten River; not named on boundary map	120	35
Yaks-koo-nák-he;[7] first creek from north below bend of Kootenay	115	30
Yak-toók-i-na;[8] third creek from north tributary to Kootenay, below bend	115	45
Yóme-tsin;[9] White Sheep Creek, tributary to the Columbia	117	50

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[1] Cultus of official map of British Columbia, 1895. A creek near by is called Sweltzer.

[2] Tcho Park Mountains of Land Office map of Washington.

[3] Tamihy of official map of British Columbia, 1895.

[4] Apparently junction of Rock Creek and Ne-hoi-al-pit-kwu.

[5] Yahk'h on boundary map.

[6] Yak-in-i-kak on boundary map and Yokinikah of Land Office map of Montana.

[7] Ramy Creek of Land Office map of Montana.

[8] Quartz Creek of Land Office map of Montana.

[9] Sheep Creek of official map of British Columbia, 1895, and Yometsin or Sheep Creek of Land Office map of Washington.

SCIENTIFIC RESULTS.

In the conduct of the survey attention was given to the geology, natural history, etc., of the region traversed. Mr. George Gibbs was attached to the survey as geologist and interpreter, C. B. R. Kennerly as surgeon and naturalist, and James M. Alden as artist. Collections were made and forwarded to Washington. These collections were placed in the hands of specialists, who prepared reports thereon. The nature and extent of these collections can be inferred from the report of the Auditor of the Treasury, already referred to.

It appears from that report that about $3,500 was expended on the preparation of reports on scientific subjects. The persons who prepared those reports, the subjects reported on, and the sums paid are set forth in the following table.[1]

Amounts paid during 1861–62 for work done in the preparation of the scientific part of the final report.

J. S. Harris, report on magnetics, with computations, etc	$743.50
F. B. Meek, report on fossil mollusks, with drawings	375.00
Theodore Gill, report on fishes	300.00
William Stimpson, report on crustaceæ and marine invertebrates	300.00
George Suckley, report on salmonidæ, ornithology, and mammals	300.00
P. B. Carpenter, report on recent mollusks	250.00
J. S. Newberry, report on fossil plants	150.00
Elliot Coues, report on birds, etc	100.00
John Torrey, report on botany	100.00
P. R. Uhler, report on insects	25.00
J. H. Richard, drawings for natural history reports	463.00
John Cassin, eight natural history drawings on stone	160.00
W. B. McMurtrie, drawings for geological reports	100.00
T. Y. Gardner, drawings of fossil plants	65.00
Thomas Egleston, jr., analysis of mineral specimens and preparing catalogue.	50.00
Mary B. Codwise, copying natural history papers	12.90
Total	3,494.40

That the reports on these various topics were prepared for insertion in the final report of the commission is abundantly proved. Mr. George Suckley, M. D., assistant surgeon, United States Army, read before the New York Lyceum of Natural History, in June, 1861, a paper entitled "Notices of certain new species of North American salmonidæ, chiefly in the collection of the Northwest Boundary Commission, in charge of Archibald Campbell, esq., commissioner of the United States, collected by Dr. C. B. R. Kennerly, naturalist to the commission."[2] In this paper he says: "Owing to the unfortunate death of Dr. Kennerly on his return from a three-years' exploration, the preparation of a report on certain of the material collected by him was assigned to me. In the course of this undertaking I have prepared a copious synopsis of the species of American salmon and trout, *to appear in the final report of the commissioner*. It has been thought best to issue in advance brief descriptions of the species hitherto unnamed." And later he alludes to papers "to be referred to in the more extended report."

Some of the fossils collected were described by Mr. F. B Meek,[3] who says, "The fossils described in this paper are the new species contained in the collections of the Northwestern Boundary Survey.

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[1] House Ex. Doc. No. 86, Fortieth Congress, third session, p. 101.

[2] Annals Lyceum Nat. Hist. New York, vol. 7, pp. 306–313, 1862.

[3] Proc. Acad. Nat. Sci. Phil., vol. 13, pp. 314–318, 1861.

Full illustrations and more extended descriptions of these and other species formerly described by the writer, from Vancouver Island, *will appear in the report of that survey*, which will also contain a report by Mr. George Gibbs, geologist of the expedition, on the general geology of the country along the boundary line."

This full report by Mr. Meek is, so far as I know, still unpublished. Dr. J. S. Newberry's report on the fossil plants seems, however, to have been published in full. At all events, he read, before the Boston Society of Natural History, on October 1, 1862, a paper entitled[1] "Descriptions of the fossil plants collected by Mr. George Gibbs, geologist to the United States Northwest Boundary Commission, under Mr. Archibald Campbell, U. S. Commissioner." This paper, published in February, 1863, "by permission of Archibald Campbell, esq., U. S. commissioner, Northwest Boundary Commission," makes no reference to any other or fuller report. The artist, Mr. James M. Alden, produced a fine series of colored sketches of scenery along the boundary line. These sketches, obviously intended to illustrate the final report, are in the State Department. There are 65 of these, all but two (large ones) included in three portfolios. These sketches and the constantly recurring allusions to the final report, and the conclusive proof that such report was prepared, sharpen the desire and emphasize the need of recovering it.

Whether the geologic report of Mr. Gibbs, alluded to by Mr. Meek, was ever published does not appear. It may be that the rather extensive paper entitled "Physical geography of the northwestern boundary of the United States, by George Gibbs, with twelve illustrations," read before the American Geographical Society November 11, 1869, and published in its journal (vol. 4, pp. 298–392, and vol. 5, pp. 134–157), is the report referred to.

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[1] Boston Jour. Nat. Hist., vol. 7, pp. 506–524, 1863.

APPENDIX A

MODE OF DETERMINING POINTS ON THE PARALLEL.

The following is the agreement as to method of determining points on the parallel by measures from the tangent. This agreement and the accompanying table are copied from the original in the State Department.

TO DETERMINE POINTS ON THE FORTY-NINTH PARALLEL BY MEANS OF THE TANGENT.

Wherever points of the parallel between the astronomical stations are to be determined it is hereby agreed to adopt the method of offsets from the tangent to the parallel.

For computing the length of these offsets the following formula is adopted, being that used in computing the difference of latitude of points in secondary triangles or those whose sides do not exceed 12 miles in length:

$$-dL=kB\cos Z+k^2C\sin^2 Z+h^2D$$

where

dL=difference of latitude of the two points;

k=length of side connecting them;

$$B=\frac{1}{R\operatorname{arc}1''};$$

$$C=\frac{\tan L}{2NR\operatorname{arc}1''};$$

$$D=\frac{\frac{3}{2}e^2\sin L\cos L\operatorname{arc}1''}{(1-e^2\sin^2 L)^{\frac{3}{2}}};$$

$h=kB\cos Z$;

$$R=\frac{a(1-e^2)}{(1-e^2\sin^2 L)^{\frac{3}{2}}};$$

$$N=\frac{a}{(1-e^2\sin^2 L)^{\frac{1}{2}}};$$

a=equatorial radius of the earth=6 974 127.31 yards;

e=eccentricity=0.081 696 830;

Z=azimuth of tangent counting from south around by west; whence west=90°, east=270°.

This formula becomes in the present case

$$-dL=k^2C;$$

or, taking offset in yards=δ, distance in yards on the tangent=D

$$\log\delta=2\log D+2.915491.$$

JNO. G. PARKE,
Lieutenant, Corps Topographical Engineers U. S., Chief Astronomer and Surveyor.
R. W. HAIG,
Captain, R. A., Astronomer British Commission.

CAMP SIMIAHMOO, *Forty-ninth Parallel, April 23, 1859.*

Miles.	Offsets.			Miles.	Offsets.		
	Yards.	Feet.	Inches.		Yards.	Feet.	Inches.
0.25	0	0	0.57	5.25	7	0	1.00
.50	0	0	2.29	.50	7	2	1.68
.75	0	0	5.16	.75	8	1	3.49
1.00	0	0	9.18	6.00	9	0	6.45
.25	0	1	2.34	.25	9	2	10.57
.50	0	1	8.65	.50	10	2	3.82
.75	0	2	4.11	.75	11	1	10.23
2.00	1	0	0.72	7.00	12	1	5.78
.25	1	0	10.47	.25	13	1	2.49
.50	1	1	9.37	.50	14	1	0.33
.75	1	2	9.42	.75	15	0	11.33
3.00	2	0	10.61	8.00	16	0	11.47
.25	2	2	0.96	.25	17	1	0.77
.50	3	0	4.45	.50	18	1	3.20
.75	3	1	9.08	.75	19	1	6.79
4.00	4	0	2.87	9.00	20	1	11.52
.25	4	1	9.80	.25	21	2	5.40
.50	5	0	5.88	.50	23	0	0.43
.75	5	2	3.11	.75	24	0	8.60
5.00	6	1	1.48	10.00	25	1	5.93

APPENDIX B.

REPORT OF J. G. PARKE, NOVEMBER 12, 1859.[1]

UNITED STATES BOUNDARY SURVEY, COLVILLE DEPOT,
Washington Territory, November 12, 1859.

SIR: I have the honor respectfully to submit the following report of the progress made during the past season in the survey of the forty-ninth parallel by the several parties of the United States commission:

The organization of the parties throughout the greater part of the season has been as follows: Two astronomical parties, one surveying party, one reconnoissance party.

Mr. G. Clinton Gardner, assistant astronomer and surveyor, in charge of an astronomical party; Professor Nooney, assistant.

Mr. Joseph S. Harris, in charge of second astronomical party; Mr. Hudson, assistant.

Mr. Charles T. Gardner, in charge of the surveying party.

Mr. H. Custer, in charge of the reconnoissance party.

Mr. J. Nevin King, in charge of Chiloweyuck depot, on Fraser rive and forwarding supplies to the parties in the field.

Dr. C. B. R. Kennerly, in charge of depot, Chiloweyuck lake, i addition to his duties as surgeon and naturalist.

Mr. George Gibbs, in addition to the geological reconnoissance, had charge of a party engaged in opening a trail through from the Skagit valley to the Similkameen.

Mr. R. V. Peabody, in charge of the subsistence and transportation for the parties to the eastward of the lake depot.

Mr. Major assisted in the computations at the astronomical stations.

The reconnoissance at the close of the last season extended as far east as the valley of the Skagit, and the astronomical observations necessary for marking the three points of the parallel in the valley of the Chiloweyuck were completed. On taking the field the present season, the first object was to complete the measurements and marking the parallel at these three stations, Tummeahai, Chiloweyuck lake, and Chuch-che-hum. Then make reconnoissance for the location of astronomical stations and the opening of trails in advance of the parties occupying these stations.

The first party, under the charge of Mr. G. C. Gardner, left Camp Simiahmoo for the Chiloweyuck depot on the eighteenth day of April.

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[1] Reprinted from Senate Ex. Doc. No. 16, 36th Cong., 1st sess., pp. 2-7.

The zenith telescope and transit instrument were put up and observations made for latitude and time. Reconnoitering and surveying parties took the field, with instructions to connect Sumass station with the depot and continue on over the trail, connecting the several astronomical stations, and to obtain the topography of the country along and adjacent to the boundary line. The pack mules were sent from their wintering station to the depot, and arrangements were made for the delivery of subsistence, stores, and forage, at that place.

A chronometer trip was made between Camp Simiahmoo and Chiloweyuck depot by a party under charge of Mr. Harris. Eleven chronometers were transported back and forth, and the entire trip being performed in whale-boats, it is confidently expected that a very nice determination of the difference of longitude will be obtained. The observations for time at the depot were made by Mr. Gardner, and those at Camp Simiahmoo by myself.

On the 19th of May, Mr. Harris left Camp Simiahmoo with the outfit for an astronomical and surveying party. On arriving at the depot, he started for the Tummeahai station, Mr. Custer having previously found a practicable route for a pack trail to that point on the left bank of the Chiloweyuck, it being impracticable at that time to cross the stream opposite the mouth of the Tummeahai. Mr. Custer commenced opening the trail; and, on Mr. Harris taking charge of the party, Mr. Custer continued his reconnoissance over to the Nooksahk, and up the tributaries of the Chiloweyuck.

The trail from the depot to Chiloweyuck lake was reopened and made practicable for pack mules, requiring bridging, corduroying, and heavy grading. The high water of the streams, and the great quantity of fallen timber, made the work very heavy, and required a strong force.

On the third of June I arrived at Chiloweyuck depot, and on the fourth, Mr. G. C. Gardner started for the lake depot. Arriving there, he put the boats in order, built a storehouse for the supplies, and commenced marking the parallel by cutting a vista through the timber across the valley, at the southern end of the lake. On the completion of this, he proceeded to Chuchchehum station, and made a cut there on the parallel, embracing the two crossings of the trail. The parallel at these stations was marked by pyramidal piles of stones from six to eight feet high, covering posts accurately marking points on the line. Mr. Harris marked the parallel in the same manner at the Tummeahai station, having cut a vista through the timber, embracing the two forks of the stream. On the completion of the work at Tummeahai, Mr. Harris proceeded to the lake depot, and commenced opening the trail through to the station on the Skagit river. Here again the work was very heavy, it requiring a force of from ten to eighteen men nearly one month to open about thirty-five miles of trail, of which nearly one-half had been traveled during the previous year. On reaching the valley of the Skagit Mr. Harris located his observatory, and commenced observations for determining the point where the parallel crosses the river.

While at Chiloweyuck depôt, I found that our supply of pack mules was insufficient to enable the parties to progress with the work without great loss of time. Mules, apparejos, and pack-saddles were purchased, and additional packers employed, so that the supplies and outfits of the several parties were carried forward as rapidly as the work progressed and the trail was opened.

On Mr. Gardner's completing the work at Chuchchehum station, we proceeded to make a reconnoissance of the country to the east of Skagit station, with a view of locating astronomical stations and determining a route for a trail through to the Similkameen and Okinakane valleys, a region of country that had been heretofore unexplored and known only to a few Indian hunters. We found a mass of rugged and heavily timbered mountains, extending north and south, and having a breadth of about seventy-five miles. Through by far the greater portion of this distance, no trails were found; but, by dint of constant work of four axemen, we were enabled to force our way through the Similkameen. A good and practicable route was however found, crossing two summits having an elevation of about six thousand feet. A road party was immediately placed upon this route, under charge of of Mr. Gibbs. He was supplied with axes, picks, and shovels; and, after five weeks' labor with a strong force, a trail was opened, so that our instruments and supplies could be packed through without difficulty.

On returning from this reconnoissance Mr. Gardner started with his party to occupy a station on the Similkameen. And Mr. Harris, having completed his determination and marking of the parallel at the Skagit station, proceeded to occupy one nearly midway between the Skagit and Similkameen, on the Pasayten, a tributary of the latter. In the meantime, the survey connecting the astronomical stations was continued by the trail, the nearest practicable line to the parallel, as well as the reconnoissance of the country on both sides of the parallel. On the completion of the observations, computations, and marking the parallel at Pasayten, Mr. Harris's party moved on to the Similkameen, and remained there in camp, while Mr. Harris accompanied me on a reconnoissance, to select another station on the Nehoialpitkwu, about thirty-five miles to the eastward. After reaching the Similkameen, we had no difficulty in traveling, the country being open and grassy, and occupied by horseback Indians; numerous well-worn trails were found running in every direction. One of these we found particularly advantageous, leading eastward from the Similkameen to Fort Colville, on the Columbia river, a distance of about one hundred miles. After crossing the divide to the east of Lake Osogoos [sic], the trail strikes the Nehoialpitkwu, and follows down the valley of this stream crossing the parallel three times.

From the astronomical station on the Similkameen, two points of the parallel, at an interval of about fifteen miles, were determined and marked by triangulation: one at the crossing of the Similkameen and the other at Lake Osoyoos, in the valley of the Okinakane. The intervening country is generally destitute of timber, and made up of a collection of knobs and high hills with intervening plains and valleys, affording good ground for the location of well conditioned triangles.

The first station on the Nehoialpitkwu was occupied by Mr. Harris, and the parallel was determined by a measurement from the observatory, on the meridian, and marked by a cut, nearly a mile in length, across the valley, and by three monuments—two of earth and one of stone. At this station the stream passes from north to the south of the parallel.

The second station on the Nehoialpitkwu, about thirty miles distant by the trail, is now occupied by Mr. Gardner's party, and Mr. Harris's party is in position on the right bank of the Columbia river, near the mouth of Clarke's Fork. It is believed that these points of the parallel will soon be determined and marked, when these parties, together with the surveying and reconnoitering parties, are instructed to repair to this point and go into winter quarters. The weather, however, is at present very severe, the ground being covered with three or four inches of snow, and the thermometer giving readings for the last three mornings as low as four, two, and ten degrees below zero.

To recapitulate, the following is the amount of work accomplished by parties of the United States commission during the present season:

A completion of the determination and marking the parallel from three points astronomically fixed at the close of the last season.

A complete set of observations for latitude at four stations, from which the parallel has been determined and marked at the crossings of the following streams: the Skagit, Pasayten, Similkameen, Okinakane, (Lake Osoyoos,) and Nehoialpitkwu. And before the astronomical parties leave the field, the necessary observations will be completed for determining two other points of the parallel, the third crossing of the Nehoialpitkwu, and the Columbia river.

A chronometer trip for difference of longitude between Camp Simiahmoo and Chilowayuck depot.

Observations of the transit of the moon and moon-culminating stars at two of the latitude stations for absolute longitude.

A triangulation covering an area of about fifty square miles.

A survey of the nearest practicable lines to the parallel, connecting the astronomical stations, making a total distance chained of about three hundred and seventy miles.

Reconnoissances for developing the topography along and adjacent to the boundary line, and for locating routes of communication. These reconnoissances have extended over an area of about six thousand square miles.

A full set of magnetic observations were made at one station. And throughout the work, all the necessary observations for time, azimuth, micrometer value, and instrumental corrections were carefully made.

The two astronomical parties and the reconnoissance party were furnished with sets of meteorological instruments. Full and detailed registers have been kept at the different stations, and, as far as possible, simultaneous readings of the barometer have been taken, while the parties were moving from station to station; which, with the corresponding observations at camp Simiahmoo and the fixed stations, will enable us to give very exact profiles of the country traversed.

The geological reconnoissance has been extended over the field of operations, and valuable collections made of botanical and natural history specimens.

The forty-ninth parallel, as far as determined during the present season, traverses a mountainous country, and, excepting a few localities, the entire region is eminently unfit for occupation or settlement. The mountains are rugged and precipitous, and attain great elevations; the ridges and peaks of the Cascade mountains being covered with perpetual snow. Glaciers were discovered; and during the months of June and July snow to the depth of two feet was encountered on our very route of travel. A heavy growth of pines and fir abounds throughout the entire line from the Gulf of Georgia, with the exception of short intervals in the valleys of the Similkameen, Okinakane, and Nehoialpitkwu.

Under the forty-ninth parallel the Cascade mountains have a breadth of about two degrees in longitude, and as the general trend of these mountains is at right angles to the line of our work, we were necessarily forced into crossing the ridges with our routes of communication, involving much labor in cutting, grading, and bridging to make these routes practicable for even pack-mule transportation. The water courses are numerous and rapid, rendering the fords frequent and dangerous. A slight rise in these streams makes them impassable. Notwithstanding the difficulties of the country and the precarious mode of transporting the instruments, I am happy to report that we have got thus far through the season's work without any damage to our astronomical instruments. I regret, however, that we have been less fortunate with the magnetic instruments. The mule carrying these missed his footing and rolled down a precipitous bank. The magnetic theodolite will have to be replaced, and the other instruments will require repairing. I also have to report the breakage of [illegible]r barometer. We were, however, able soon to replace this instru[illegible]t from the lake depot.

On reaching the valleys of the Similkameen and Okinakane we were met by our additional escort, under the command of Captain Archer, United States army. I take great pleasure in acknowledging my obligations for the timely and valuable assistance rendered us by himself and officers of his command.

Preparations are now making at this place to winter the several parties on their return from the field. A great abundance of material for building quarters is found directly at hand. A supply of provisions has been procured.

The winters of this region are reported to be very severe on animals, the snow falling to a great depth. We have laid in a good stock of hay, and, by erecting temporary shelter, we have little fears of losing any of our mules.

Our work during the next season will extend from the Columbia river to the Rocky mountains. From careful inquiry, the entire distance is represented as mountainous and timbered, excepting perhaps a short stretch in the valley of the Kootenay, near the base of the Rocky mountains. In this valley the Hudson's Bay Company have a trading post near to the parallel. This post is supplied from Fort Colville, and the company's trail to that point will no doubt be of great service to us in sending parties to the line, particularly to those stations close to the Rocky mountains.

In reference to the mode or order of proceeding with the astronomical stations during the next season, I would respectfully suggest that we be allowed to proceed directly to the extreme eastern stations, so that on the melting of the snows, we will be able to complete those, and retire in good season, leaving these nearer this depot for the last. By following this plan we will have less difficulty in falling back on this place, in the event of any great detention or delay from ruggedness of country and swollen streams, or even should the winter set in before the completion of the work. It is confidently expected, however, that we will be able to complete all of the astronomical stations during the next season. Mr. Gibbs is at present making a reconnoissance of the trail in the direction of the Kootenay. This will enable us to commence in the early spring with a working party on this route. It is believed that we will have to build bridges and make flatboats for ferrying Clarke's Fork (Pend d'Oreille) and one of its tributaries, besides much cutting and corduroying.

Before closing this report I take great pleasure in again commending to you the great zeal and devotion to duty evinced by the assistant astronomer and surveyor, and the several assistants engaged upon the work; and I am happy to say that the amount of work accomplished during the season has quite equalled the highest estimates.

I have the honor to be, very respectfully, your obedient servant,

JOHN G. PARKE,

Lieut. Corps Top. Eng's, Chief Astron'r and Surv'r.

APPENDIX C.

REPORT OF ARCHIBALD CAMPBELL, FEBRUARY 3, 1869.[1]

UNITED STATES NORTHWESTERN BOUNDARY COMMISSION.
Washington, D. C., February 3, 1869.

SIR: I have the honor to acknowledge the receipt of your letter of the 16th ultimo, asking for information concerning the matters mentioned in a resolution of the House of Representatives of the 13th of January:

> That the Secretary of State be directed to communicate to the House the total amount expended for the northwestern boundary commission, and to give in detail the items of expenditure, the number and names of persons employed in such commission, how long employed, and at what salaries, and the nature and extent of the services performed.

In reply to your letter I have the honor to transmit herewith the following papers:

Financial statement, January 1, 1869, marked A.

List of persons composing the commission, with rates of salaries &c., marked B.

List of assistants employed in running and marking the boundary line, with statement of pay, &c., marked C.

List of assistants employed in working up the results of the survey, with statement of pay, &c., marked D.

Statement of labor employed in running and marking the boundary line, marked E.

Statement of services of Indians, marked F.

In regard to "the nature and extent of the services performed," nothing short of the full reports of the chief astronomer and surveyor, and other officers of the commission, and the detailed maps of the survey of the boundary line, can give an adequate idea of the subject. It is not supposed, however, that the House of Representatives desires so comprehensive a reply to their inquiry. I shall therefore endeavor as briefly as possible to furnish the information called for.

On the 11th August, 1856, Congress passed a law, authorizing the appointment of a commission on the part of the United States, to unite with a similar commission to be appointed by Great Britain, for the purpose of carrying into effect the first article of the treaty of June 15,

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[1] Reprinted from House Ex. Doc. 86, 40th Congress, 3d session.

1846, that is, to determine and mark the boundary line between the United States and British possessions, agreed upon in the treaty, viz:

> From the point on the 49th parallel of north latitude, where the boundary laid down in existing treaties and conventions between the United States and Great Britain terminates, * * * westward along the said 49th parallel of north latitude, to the middle of the channel which separates the continent from Vancouver's island, and thence southerly, through the middle of the said channel and of Fuca's straits, to the Pacific ocean.

Toward the close of the year the British Government appointed Captain Prevost, royal navy, commanding steamer Satellite, first commissioner to determine that part of the line which runs through "the channel which separates the continent from Vancouver's island," and announced that he had started on his way to the vicinity of the boundary line, and that Captain Richards, royal navy, second commissioner, would shortly follow.

Although the powers of the British commission were limited to tne determination of the water-boundary alone, while the act of Congress authorized, on the part of the United States, the determination of the boundary from the crest of the Rocky mountains to the Pacific ocean, the President decided to carry out the law by the appointment of officers authorized thereby, and to notify the British government of the difference between the powers of the two commissions. In February, 1857, I was appointed commissioner, Lieutenant John G. Parke, United States army, chief astronomer and surveyor, and G. Clinton Gardner, assistant astronomer and surveyor, on the part of the United States.

Under instructions from the State Department, the United States commission was duly organized and directed to repair to Fuca's straits, via San Francisco, to meet the British commission. At the close of June, I met Captain Prevost, the British commissioner, at Esquimalt harbor, at the southern end of Vancouver's island, and was informed by him that until the arrival of Captain Richards, second commissioner, with the surveying party, he was not prepared to enter upon the determination of the water boundary. The United States commissioner therefore proceeded to the western terminus of the 49th parallel, on the main land, and established a depot and located an observatory, for the commencement of the survey along the 49th parallel, eastward, to the crest of the Rocky mountains. The British government not yet having provided a commissioner for that part of the boundary line, we were obliged to commence the work without its co-operation. Reconnoissances and explorations in the vicinity of the boundary line were at once commenced, and continued as long as the season permitted field operations. Before the spring, four astronomical points on the 49th parallel were determined, and the country thoroughly reconnoitered in the vicinity of the parallel, for a considerable distance eastward.

Towards the close of October, Captain Prevost visited the 49th parallel and informed me that Captain Richards had not yet arrived, but that, as he had satisfied himself of the general accuracy of the United States Coast Survey chart of the channels and islands between the continent and Vancouver's island, he should act independently of him. He therefore proposed that we should at once proceed to the determination of the water boundary. Several meetings of the joint commission accordingly took place, at which the question of the boundary channel was verbally discussed. The British commissioner claimed Rosario straits (the channel nearest the continent,) while I claimed the Canal de Haro, (the channel nearest Vancouver's island) as the boundary channel, intended by the treaty. Between these two channels lies the Haro archipelago, a group of islands, of which San Juan forms a part.

The verbal discussion was followed by a correspondence on the subject, in which the merits of the question were fully set forth. Captain Prevost concluded the correspondence by a proposition to compromise the difference, by running the boundary through an intermediate channel which would secure the island of San Juan to Great Britain. This proposition I declined.

For more full information in regard to the question of the water boundary I would respectfully refer to Senate Ex. Doc. No. 29, 2d session, 40th Congress. This document contains the correspondence above referred to, with a geographical memoir of the islands in dispute, and a map and cross-sections of the channels.

In conformity with the fifth section of the act organizing the commission, the President (through the Secretary of the Treasury) directed the Superintendent of the Coast Survey to place the steamer Active and brig Fauntleroy at the disposal of the commissioner when required. Both vessels were accordingly employed for the survey and soundings of the various channels and islands between the continent and Vancouver's island, a portion of the expenses of the Active being paid by the commission during the time that vessel was employed on this duty.

After the arrival of the British surveying steamer Plumper, Captain Richards co-operated with the United States Coast Survey vessels, and a thorough and complete survey of all the channels and islands between the continent and Vancouver's island south of the 49th parallel was made.

The map above referred to is the result of this joint survey, which occupied several seasons.

In the summer of 1858 Col. J. S. Hawkins, royal engineers, appointed by the British government commissioner to determine the boundary line along the 49th parallel, arrived from England with a suitable party organized for field operations. At the time of his arrival the excitement arising from the discovery of gold on Frazer river was at its height. This event caused for a time great increase in the price of labor and supplies, and created considerable embarrassment, delay, and additional expense in the field operations of the season.

A meeting of the joint commission was held for the purpose of agreeing upon a plan of field operations for the survey of the land boundary. The following is a copy of the arrangement made:

> After discussing plans for determining and marking the line as far eastward as the Cascade mountains, it was concluded to be inexpedient at the present time, in consequence of the great expense, consumption of time, and the impracticable nature of the country, to mark the whole boundary by cutting a track through the dense forest.
>
> It was therefore agreed to ascertain points on the line by the determination of astronomical points at convenient intervals on or near the boundary, and to mark such astronomical stations, or points fixed on the parallel forming the boundary, by cutting a track of not less than 20 feet in width on each side for the distance of half a mile or more, according to circumstances. Further, that the boundary be determined and similarly marked where it crosses streams of any size, permanent trails, or any striking natural feature of the country.
>
> In the vicinity of settlements on or near the line, it is deemed advisable to cut the track for a greater distance, and to mark it in a manner to be determined hereafter.

The work of running and marking the land boundary was carried on through a country previously almost unknown. The 49th parallel extends over rugged and precipitous mountains that attain great elevation, and in the Cascade range, on and near the boundary, perpetual snow covers many of the peaks, whose northern gorges are filled up with immense glaciers. The timber on the western slope of the Cascade mountains is dense, being a heavy growth of pine and fir, that in many places stands over a fallen forest not yet decayed. This is the character of the country as far east as the valley of the Similkameen river, one of the tributaries of the Columbia. Here the timber becomes more open and surveying operations less difficult.

After passing the Okinokane river, which is the lowest line of the great valley between the Cascade and the Rocky mountains, the country again becomes rough and the timber more dense, but less so than the western slope of the Cascade mountains.

It being impossible to follow the 49th parallel continuously, the line of survey was carried over the nearest practicable route for a pack trail, connecting each astronomical station, making a total length of line of survey of about 800 miles. Astronomical stations were established by parties of the joint commission at almost every accessible point from which the boundary line is ascertained, and marked by a vista across all valleys and trails, where rough stone monuments were erected over posts buried in the ground to indicate the exact line.

The reconnaissance work extends over an area of about 30,000 square miles. Within this space the barometrical heights of over 800 points have been obtained.

A magnetic survey, extending over a range of 8° 20′ in latitude and 4° in longitude, with the necessary observations of the magnetic elements of the astronomical stations, was also made.

The entire length of the land boundary line is over 9° in longitude, or about 410 miles, and the length of the route traveled in surveying it is double that distance. Trails had to be opened for three-fourths of the distance traveled, involving great labor in cutting, grading, and bridging to make the route practicable for pack-mule transportation. The water-courses were numerous and rapid, rendering the fords frequent and dangerous; and a slight rise of many of the streams would have made them impassable but for the timely precaution of building bridges at small streams and ferry boats at the river crossings. Many of the trails opened are now traveled routes to the mines then and since discovered, which are rapidly developing that section of the country, where almost every valley of any extent affords facilities for agricultural pursuits.

In collating the results of the survey reports upon the geology, botany, and natural history of the country reconnoitered were prepared, and complete maps, on a large scale, made of the entire boundary and the adjacent country. A general map has also been made, showing the extent of the country traversed. And to facilitate the survey of the public lands, photographic duplicates of the detailed sheets, showing each monument on the boundary line, with its geographical position, were furnished to the General Land Office. Photographic duplicates of the detailed sheets of the water boundary have also been made and furnished the Department of State in illustration of the question of the boundary channel.

I have the honor to be, very respectfully, your obedient servant,

ARCHIBALD CAMPBELL,
Commissioner Northwest Boundary Survey.

Hon. WILLIAM H. SEWARD,
Secretary of State.

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[Bulletin 174.]

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The map sheets represent a great variety of topographic features, and with the aid of descriptive text they can be used to illustrate topographic forms. This has led to the projection of an educational series of topographic folios, for use wherever geography is taught in high schools, academies, and colleges. Of this series the first two folios have been issued, viz:

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2. Physiographic types, by Henry Gannett, 1900, folio, consisting of the following sheets and 11 pages of descriptive text: Norfolk (Va.-N. C.), a coast swamp; Marshall (Mo.), a graded river; Lexington (Nebr.), an overloaded stream; Harrisburg (Pa.), Appalachian ridges; Poteau Mountain (Ark.-Ind. T.), Ozark ridges; Marshall (Ark.), Ozark Plateau; West Denver (Colo.), hogbacks; Mount Taylor (N. Mex.), volcanic peaks, plateaus, and necks; Cucamonga (Cal.), alluvial cones; Crater Lake special (Oreg.), a crater.

GEOLOGIC ATLAS OF THE UNITED STATES.

The Geologic Atlas of the United States is the final form of publication of the topographic and geologic maps. The atlas is issued in parts, or folios, progressively as the surveys are extended, and is designed ultimately to cover the entire country.

Under the plan adopted the entire area of the country is divided into small rectangular districts (designated *quadrangles*), bounded by certain meridians and parallels. The unit of survey is also the unit of publication, and the maps and descriptions of each rectangular district are issued as a folio of the Geologic Atlas.

Each folio contains topographic, geologic, economic, and structural maps, together with textual descriptions and explanations, and is designated by the name of a principal town or of a prominent natural feature within the district.

Two forms of issue have been adopted, a "library edition" and a "field edition." In both the sheets are bound between heavy paper covers, but the library copies are permanently bound, while the sheets and covers of the field copies are only temporarily wired together.

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17	Marysville	California	121° 30′-122°	39°-39° 30′	925	25
18	Smartsville	California	121°-121° 30′	39°-39° 30′	925	25
19	Stevenson	Alabama Georgia Tennessee	85° 30′-86°	34° 30′-35°	980	25
20	Cleveland	Tennessee	84° 30′-85°	35°-35° 30′	975	25
21	Pikeville	Tennessee	85°-85° 30′	35° 30′-36°	969	25
22	McMinnville	Tennessee	85° 30′-86°	35° 30′-36°	969	25
23	Nomini	Maryland Virginia	76° 30′-77°	38°-38° 30′	938	25
24	Three Forks	Montana	111°-112°	45°-46°	3,354	50
25	Loudon	Tennessee	84°-84° 30′	35° 30′-36°	969	25
26	Pocahontas	Virginia West Va	81°-81° 30′	37°-37° 30′	951	25
27	Morristown	Tennessee	83°-83° 30′		963	25
28	Piedmont	Maryland West Va	79°-79° 30′	39°-39° 30′	925	25
29	Nevada City:					
	Nevada City	California	121° 00′ 25″-121° 03′ 45″	39° 13′ 50″-39° 17′ 16″	11.65	50
	Grass Valley		121° 01′ 35″-121° 05′ 04″	39° 10′ 22″-39° 13′ 50″	12.09	
	Banner Hill		120° 57′ 05″-121° 00′ 25″	39° 13′ 50″-39° 17′ 16″	11.65	
30	Yellowstone National Park:					
	Gallatin Canyon Shoshone Lake	Wyoming	110°-111°	44°-45°	3,412	75
31	Pyramid Peak	California	120°-120° 30′	38° 30′-39°	932	25
32	Franklin	Virginia West Va	79°-79° 30′	38° 30′-39°	932	25
33	Briceville	Tennessee	84°-84° 30′	36′-36° 30′	963	25
34	Buckhannon	West Va	80°-80° 30′	38° 30′-39°	932	25
35	Gadsden	Alabama	86°-86° 30′	34°-34° 30′	986	25
36	Pueblo	Colorado	104° 30′-105°	38°-38° 30′	938	50
37	Downieville	California	120° 30′-121°	39° 30′-40°	919	25
38	Butte Special	Montana	112° 29′ 30″-112° 36′ 42″	45° 59′ 28″-46° 02′ 54″	22.80	50
39	Truckee	California	120°-120° 30′	39°-39° 30′	925	25
40	Wartburg	Tennessee	84° 30′-85°	36°-36° 30′	963	25
41	Sonora	California	120°-120° 30′	37° 30′-38°	944	25
42	Nueces	Texas	100°-100° 30′	29° 30′-30°	1,035	25
43	Bidwell Bar	California	121°-121° 30′	39° 30′-40°	918	25
44	Tazewell	Virginia West Va	81° 30′-82°	37°-37° 30′	950	25
45	Boise	Idaho	116°-116° 30′	43° 30′-44°	864	25
46	Richmond	Kentucky	84°-84° 30′	37° 30′-38°	944	25
47	London	Kentucky	84°-84° 30′	37°-37° 30′	950	25
48	Tenmile District Special.	Colorado	106° 8′-106° 16′	39° 22′ 30″-39° 30′ 30″	55	25
49	Roseburg	Oregon	123°-123° 30′	43°-43° 30′	871	25
50	Holyoke	Mass Conn	72° 30′-73°	42°-42° 30′	885	50
51	Big Trees	California	120°-120° 30′	38°-38° 30′	938	25
52	Absaroka:					
	Crandall Ishawooa	Wyoming	109° 30′-110°	44°-44° 30′	1,706	25
53	Standingstone	Tennesse	85°-85° 30′	36°-36° 30′	963	25

[a] Out of stock.

No.	Name of sheet.	State.	Limiting meridians.	Limiting parallels.	Area, in square miles.	Price, in cents.
54	Tacoma	Washington.	122°–122° 30′	47°–47° 30′	812	25
55	Fort Benton	Montana	110°–111°	47°–48°	3, 273	25
56	Little Belt Mts	Montana	110°–111°	46°–47°	3, 295	25
57	Telluride	Colorado	107° 45′–108°	37° 45′–38°	236	25
58	Elmoro	Colorado	104°–104° 30′	37°–37° 30′	950	25
59	Bristol	Virginia Tennessee	82°–82° 30′	36° 30′–37°	957	25
62	Menominee Special	Michigan	87° 44′–88° 09′	45° 44′–45° 55′	254	25

STATISTICAL PAPERS.

Mineral Resources of the United States, 1882, by Albert Williams, jr. 1883. 8°. xvii, 813 pp. Price 50 cents.

Mineral Resources of the United States, 1883 and 1884, by Albert Williams, jr. 1885. 8°. xiv, 1016 pp. Price 60 cents.

Mineral Resources of the United States, 1885. Division of Mining Statistics and Technology. 1886. 8°. vii, 576 pp. Price 40 cents.

Mineral Resources of the United States, 1886, by David T. Day. 1887. 8°. viii, 813 pp. Price 50 cents.

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On March 2, 1895, the following provision was included in an act of Congress:

"*Provided*, That hereafter the report of the mineral resources of the United States shall be issued as a part of the report of the Director of the Geological Survey."

In compliance with this legislation the following reports have been published:

Mineral Resources of the United States, 1894, David T. Day, Chief of Division. 1895. 8°. xv, 646 pp., 23 pl.; xix, 735 pp., 6 pl. Being Parts III and IV of the Sixteenth Annual Report.

Mineral Resources of the United States, 1895, David T. Day, Chief of Division. 1896. 8°. xxiii, 542 pp., 8 pl. and maps; iii, 543–1058 pp., 9–13 pl. Being Part III (in 2 vols.) of the Seventeenth Annual Report.

Mineral Resources of the United States, 1896, David T. Day, Chief of Division. 1897. 8°. xii, 642 pp., 1 pl.; 643–1400 pp. Being Part V (in 2 vols.) of the Eighteenth Annual Report.

Mineral Resources of the United States, 1897, David T. Day, Chief of Division. 1898. 8°. viii, 651 pp., 11 pl.; viii, 706 pp. Being Part VI (in 2 vols.) of the Nineteenth Annual Report.

Mineral Resources of the United States, 1898, by David T. Day, Chief of Division. 1899. 8°. viii, 616 pp.; ix, 804 pp., 1 pl. Being Part VI (in 2 vols.) of the Twentieth Annual Report.

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THE DIRECTOR,
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